Application Notes, Article Reprints and Engineering Bulletins

ON Semiconductor
Formerly a Division of Motorola

Reference Materials
Selector Guide

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Reference Materials Selector Guide

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PUBLICATION ORDERING INFORMATION

Introduction

ON Semiconductor's "applications literature" provides guidance to the effective use of its Analog, Discrete and Logic product families across a broad range of practical applications. Many different topics are discussed – in a way that is not always possible in a device data sheet. These may range from detailed circuit designs complete with PCB layouts, through matters to consider when embarking on a design, to overviews of a new product family and its design philosophy.

Information is presented in the form of Application Notes (AN's), Article Reprints[1] (AR's) and Engineering Bulletins (EB's). The Application Notes, Article Reprints, and Engineering Bulletins are included to enhance the user's knowledge and understanding of ON Semiconductor's products. However, before attempting to design–in a device referenced in these documents, please contact your local ON Semiconductor supplier or sales representative for product availability and available application support.

Information in this document is given in good faith and no liability is accepted for errors or omissions. Includes literature published or revised between December 1, 1997, and October 1, 1999.

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1. Article Reprints are documents that were originally published in trade or press and have been reprinted with permission of the specific publisher.

Document Number	Product Class	Title	Abstract	PDF or Mfax
AN004E	D	*Semiconductor Consideration for DC Power Supply Voltage Protector Circuit Protectors*	This paper addresses the requirements for the semiconductor sensing circuitry and SCR crowbar devices used in DC power supply over/under voltage protection schemes.	Mfax
AN1020	D	*A High-Performance Video Amplifier for High Resolution CRT Applications*	This note describes a state-of-the-art video amplifier making use of the superior performance characteristics of Motorola CRT driver transistors. In particular, it shows the high speed obtainable with low DC power consumption. The circuit is insensitive to load variations and interconnect methods.	Mfax
AN1040	D	*Mounting Considerations for Power Semiconductors*	The operating environment is a vital factor in setting current and power ratings of a semiconductor device. Reliability is increased considerably for relatively small reductions in junction temperature. Faulty mounting not only increases the thermal gradient between the device and its heat sink, but can also cause mechanical damage. This comprehensive note shows correct and incorrect methods of mounting all types of discrete packages, and discusses methods of thermal system evaluation.	Mfax
AN1042	D	*High Fidelity Switching Audio Amplifiers Using TMOS Power MOSFETs*	Switching audio amplifiers were impractical before the availability of complementary Power MOSFETs. Now, gate drive circuitry is simpler than for bipolar transistors, and the MOS devices operate more efficiently at higher frequencies. This detailed discussion of switching amplifier design is supported by a 72W Class D circuit.	Mfax
AN1043	D	*Spice Model for TMOS Power MOSFETs*	SPICE is a user-friendly, general-purpose circuit simulation program for non-linear DC, non-linear transient and linear AC analysis. It is now available in various commercial versions for use on personal computers. Motorola and the LAAS-CNRS Research Laboratory have built a TMOS Power MOSFET library to simplify power dissipation simulation using SPICE. This note describes how to use the library; the physics of the Power MOSFET; the implementation of the model within SPICE; the method of extracting the parameters for the library; and a comparison of practical and simulated characteristics. The library is printed here and is also available on disk.	Mfax

Document Number	Product Class	Title	Abstract	PDF or Mfax
AN1045	D	*Series Triacs in AC High Voltage Switching Circuits*	An analysis of the circuit design of series connected triacs used to create high voltage switches operating up to 2000 volts. Triacs offer many advantages over electromechanical switches, but blocking voltage and dV/dt capability must often be far higher than the line voltage would suggest. Properly designed series circuits can solve many of the problems.	Mfax
AN1046	A&D	*Three Piece Solution for Brushless Motor Controller Design*	Until recently, the design of compact but comprehensive circuits taking full advantage of the unique attributes of brushless DC motors has been difficult, while available power transistors have not always performed as well as is necessary for the application. This high-performance three-chip solution couples the rugged MPM3003 three phase MOSFET bridge (in a 12-pin power package) with the MC33035 Brushless DC Motor Controller and the MC33039 Closed-Loop Brushless Motor Adapter. Design is simplified, board area reduced. Full circuit, parts list, and discussion of practical considerations.	Mfax
AN1048	D	*RC Snubber Networks for Thyristor Power Control and Transient Suppession*	RC Snubbers are used to control transients that could falsely turn on a thyristor or triac. But if not used properly they can cause unreliable operation and even damage to the device. This detailed analysis of the problem examines the physics, and provides design examples for many practical applications.	Mfax
AN1049	D	*The Electronic Control of Fluorescent Lamps*	A circuit is described including PCB artwork and component layout that demonstrates the use of the BUL45 bipolar power transistor for fluorescent lamp control. Electronic control can improve efficiency, extend lamp life and eliminate low frequency flicker. This note discusses the limitations of different types of 'electronic ballast', and shows how the specially designed BUL45 can provide excellent performance without special screening or matching.	Mfax
AN1076	D	*Speeding up Horizontal Outputs*	Motorola's SCANSWITCH transistors are designed specifically as fast drivers for horizontal outputs. Optimum performance is achieved when 5 base drive conditions are met. This successful base drive circuit starts with the output transistor's physics and works back to the horizontal oscillator.	Mfax

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Document Number	Product Class	Title	Abstract	PDF or Mfax
AN1078	A&D	*New Components Simplify Brush DC Motor Drives*	A variety of new components simplify the design of brush motor drives. One is a brushless motor control IC which is easily adapted to brush motors. Others include multiple Power MOSFETs in H-Bridge configuration, a new MOS turn-off device, and gain-stable opto level shifters. Several circuits illustrate how the new devices can be used in practical motor drives, in particular to control speed in both directions and operate from a single power supply.	Mfax
AN1080	A&D	*External-Sync Power Supply with Universal Input Voltage Range for Monitors*	A variety of new components simplify the design of brush motor drives. One is a brushless motor control IC which is easily adapted to brush motors. Others include multiple Power MOSFETs in H-Bridge configuration, a new MOS turn-off device, and gain-stable opto level shifters. Several circuits illustrate how the new devices can be used in practical motor drives, in particular to control speed in both directions and operate from a single power supply.	Mfax
AN1083	D	*Basic Thermal Management of Power Semiconductors*	As a rule of thumb, for every 10degC rise in junction temperature above 100degC, the operating life of the device is halved. But for various reasons, thermal management of power semiconductors is often overlooked ‹ when the system is ready for packaging, it may be too late. A discussion of Bipolar and Power MOSFET thermal characteristics and how to measure them under various conditions.	Mfax
AN1090	D	*Understanding and Predicting Power MOSFET Switching Behavior*	RC time constants and Miller capacitance have their uses, but they are not the best way to predict MOSFET switching speed or select a power MOSFET's gate drive resistor. An alternative approach that capitalises on the nature of the load makes selection of the resistor quite simple.	Mfax
AN1091	L	*Low Skew Clock Drivers and their System Design Considerations*	With microprocessor-based systems now running at 33MHz and beyond, low-skew clock drivers have become essential ‹ Motorola produces several devices with less than 1ns skew between outputs. Unfortunately, simply plugging one of these high performance clock drivers into a board does not guarantee trouble-free operation. Careful board layout and system noise considerations must also be taken into account.	pdf

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Page 3

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AN1092	L	*Driving High Capacitance DRAMs in an ECL System*	In systems where speed and efficiency are of utmost importance, designers often mix technologies to achieve the right combination of speed, power, cost and processing capability. Motorola's Emitter Coupled Logic (ECL) makes it possible to operate up to 1GHz clock rates. However, ECL speeds are not necessary in memory that is not accessed every clock cycle ‹ a large CMOS DRAM is cheaper and uses less power and board space than ECL memory. The MC10H/100H660 4-bit ECL-TTL Load Reducing DRAM Driver was designed as a translator for such applications.	Mfax
AN1101	A&D	*One-Horsepower Off-Line Brushless Permanent Magnet Motor Drive*	Brushless Permanent Magnet (BPM) motors (brushless DC motors) using MOSFET inverters are common in low voltage, variable speed applications such as disk drives. Higher voltage off-line applications can also use the same technology, but there have been problems in designing a reliable, low-cost high side driver and understanding the more subtle effects of diode snap and PCB layout. This one-horsepower off-line BPM motor drive board uses opto-isolators and a special MOSFET turn-off IC for level translation. Includes PCB artwork and parts list, and a discussion of the theory.	Mfax
AN1102	D	*Interfacing Power MOSFETs to Logic Devices*	Most popular power MOSFETs need 10 volts of gate drive to support their maximum drain current. This creates problems when attempting to drive from 5V logic. The new Logic Level power MOSFETs solve some but not all of the problems. This note discusses easy methods of directly interfacing both types of MOSFET to TTL and CMOS logic, and to microprocessors such as the M68HC11. Discusses a method of calculating switching times, to minimise switching losses, and stresses the significance of logic power supply variations.	Mfax
AN1108	D	*Design Considerations for a Two Transistor, Current Mode Forward Converter*	This design for a 150W, 150KHz, two transistor, current mode forward converter illustrates solutions for noise control, feedback circuit analysis and magnetic component design ‹ topics that often create the most problems for designers. Improved Schottky rectifiers, power MOSFETs and optocouplers ‹ and their effects on switched mode power supply design ‹ are also considered. Includes circuit, analysis, parts list and theoretical discussion.	Mfax

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AN1308	D	*100 and 200 Watt High Fidelity Audio Amplifiers Utilizing a Wideband Low Feedback Design*	A new pair of complementary bipolar power transistors ‹ the 2SC3281 and 2SA1302 ‹ have better linearity than earlier devices used in high power audio amplifiers. The amplifier circuits presented here use a topology that is fully complementary in design with a dual differential input. Other goals are a wide open-loop bandwidth (greater than the audio band) and minimal negative feedback (less than 25dB). The purpose is to show that a low feedback design can yield low distortion without any special distortion cancelling circuitry lor localised feedback loops.	Mfax
AN1314	A	*Automatic Line Voltage Selector*	Line voltage selection for international equipment has traditionally been achieved by a manual switch, a solution that invites malfunction, damage or safety hazard due to human error. This note describes an automatic line voltage selector circuit for use in switching power supplies. It makes use of the MC34161 Voltage Monitor IC, and keeps its output voltage in an acceptable range for the remainder of the supply by sensing the amplitude of the line voltage at its input. The circuit is easy to incorporate into existing AC switchmode designs with little extra cost or space requirement.	Mfax
AN1317	D	*High-Current DC Motor Drive Uses Low On-Resistance Surface Mount MOSFETs*	Surface mount technology has hitherto been used in controllers for small disk drive motors with peak currents of 1 or 2 amps. Now the availability of low ON-resistance, surface mount power MOSFETs has increased the current handling capability of surface mount technology. This application note presents a 5 amp DC motor drive board (DEVB148) using all surface mount components apart from the filter capacitor. It features a cycle-by-cycle current limit and is intended for direct control from a microcontroller.	Mfax
AN1319	D	*Design Considerations for a Low Voltage N-Channel H-Bridge Motor Drive*	Complementary MOSFET half-bridges are commonly used in low voltage motor drives to simplify gate drive design. However the P-channel FET in the half-bridge usually has higher ON-resistance or is larger and more expensive than the N-channel device. The alternative is to use an N-channel half-bridge, which uses silicon more efficiently and minimises cost and conduction losses. The trade-off is usually a more complex gate drive; this note looks at ways of minimising gate drive complexity, and also discusses diode snap, shoot-through current and general design considerations. A design is implemented in the DEVB151 development board.	Mfax

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AN1320	D	*300 Watt, 100kHz Converter Utilizes Economical Bipolar Planar Power Transistors*	Although MOSFETs are often preferred for new switchmode power supply designs, Motorola has now extended the capabilities of bipolar transistors using a new planar process. This 300W forward converter operates at 100kHz, and demonstrates the performance that may be achieved with the MJW18010 planar bipolar power transistor. Discusses the merits of planar devices in this application, and provides circuit analysis for all major sections including the output transformer. The design is 84% efficient with 1% voltage regulation, at a lower cost than the MOSFET alternative.	Mfax
AN1321	D	*Brushless DC Motor Drive Incorporates Small Outline Integrated Circuit Packaged MOSFETs*	Product miniaturization demands smaller components, including semiconductors. Surface mount components now include power MOSFETs in SOIC (Small Outline Integrated Circuit) surface mount packages. In particular the MMDF2C05E, an S0-16 packaged complementary half-bridge, is relatively easy to implement into a motor drive system. This application note describes a brushless DC motor drive design similar in size to those found in hard disk drives. The evaluation board DEVB156 resulted from the design; it is partitioned into control, power, feedback and motor sections.	Mfax
AN1327	D	*Very Wide Input Voltage Range, Off-line Flyback Switching Power Supply*	One of the problems for power supply designers is coping with the very wide input voltage range presented by the international marketplace. Forward mode switching power supplies operate typically over a single system's range, such as 90-130V AC or 200-270V AC. Creating products for specific markets or using jumpers can be costly or at least inconvenient. This design for a discontinuous mode flyback converter can operate over a 6.6:1 input voltage range without affecting its reliability. This is done by changing its mode of operation and by using new power MOSFETs with breakdown voltage ratings of 1200V.	pdf

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AN1400	L	*MC10/100H640 Clock Driver Family I/O SPICE Modelling Kit*	The difficulties of designing high-speed, controlled-impedance PC boards ‹ and the expense of reworking them ‹ makes it essential for designers to model circuit performance prior to committing to a layout. This note provides sufficient information for basic SPICE analysis on the interconnect traces driving or being driven by the 'H640, 'H641, 'H642, 'H643, 'H644 and 'H645 clock distribution chips. It includes schematics of the input, output and ESD protection structures, and package models which may affect the waveforms. A SPICE parameter set for the referenced devices is provided.	pdf
AN1401	L	*Using SPICE to Analyze the Effects of Board Layout on System Skew designing with the MC10/100H640 Family of Clock Drivers*	Illustrates the complex influences of board layout on the total skew of a system when designing with the MC10H/100H64x family of clock drivers. Discusses transmission line theory and the various termination techniques, and presents guidelines to assist designers in analyzing board layouts and loading schemes using SPICE simulations to predict and minimise the total skew of a system.	pdf
AN1402	L	*MC10/100H00 Translator Family I/O SPICE Modelling Kit*	The difficulties of designing high-speed, controlled-impedance PC boards ‹ and the expense of reworking them ‹ makes it essential for designers to model circuit performance prior to committing to a layout. This note provides sufficient information for basic SPICE analysis on the interconnect traces driving or being driven by the 'H600, 'H601, 'H602, 'H603, 'H604, 'H605, 'H606 and 'H607 translator chips. It includes schematics of the input, output and ESD structures, and package models which may affect the waveforms. A SPICE parameter set for the referenced devices is provided.	pdf
AN1403	L	*FACT I/O Model Kit*	This note provides SPICE information to allow users to perform system level interconnect modelling for the Motorola FACT(tm) logic family. It contains representative circuit schematics of the different I/O structures and a worst case package model schematic used in the FACT family. A list of SPICE parameters for the referenced transistors is included. (The information is not intended for the purpose of extensive device modelling).	pdf

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Page 7

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AN1404	L	*ECLinPS Circuit Performance at Non-Standard VIH Levels*	When ECLinPS devices are interfaced to other technologies there may be times when the input voltages do not meet the specification detailed in the ECLinPS data book. This application note discusses the consequences of driving ECLinPS devices with an Input Voltage HIGH level which is outside the specification.	pdf
AN1405	L	*ECL Clock Distribution Techniques*	Clock skew ‹ the time difference between supposedly simultaneous clock transitions within a system ‹ is one of the main factors limiting system performance at high frequencies. If clock skew can be reduced, designers can increase performance without using faster logic or more complex and more expensive architectures. Emitter Coupled Logic (ECL) technologies offer a number of advantages over the CMOS and TTL alternatives; this note describes the advantages, the three skew problem areas, and methods of clock distribution to minimise skew.	pdf
AN1406	L	*Designing with PECL (ECL at +5.0V)*	Positive Emitter Coupled Logic (PECL) provides a high speed solution for the CMOS/TTL designer. The technique involves standard ECL devices running of a positive power supply. ECL, and so PECL, has long been the 'black magic' of the logic world; by breaking down the misconceptions concerning its use, CMOS and TTL designers can gain a powerful solution to the most difficult of high speed problems. This note has the details.	pdf
AN1410	L	*Configuring and Applying the MC74HC4046A Phase-Locked Loop*	Note describes a versatile device for 0.1 to 16MHz frequency synchronization.	pdf
AN1503	L	*ECLinPS(tm) I/O SPICE Modelling Kit*	A series of representative schematics for the different I/O circuits used in the ECLinPS and ECLinPS Lite families to allow users to perform system interconnect modelling. SPICE parameters for the transistors referenced in the schematics are also provided.	pdf
AN1504	L	*Metastability and the ECLinPS(tm) Family*	Examines the concept of metastability ‹ an anomalous state caused typically by violation of set-up and hold times ‹ with a theoretical discussion of the reasons for it. Presents an equation characterising metastability and derives a test circuit. Metastability results are then applied to the ECLinPS family.	pdf

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Page 8

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AN1520	D	*HDTMOS Power MOSFETs Excel in Synchronous Rectifier Applications*	The new HDTMOS technology combines VLSI techniques with the ruggedness of vertical power structures to obtain increased cell density and to provide devices with lower overall on-resistance. The reverse recovery characteristic of the parasitic body diode is also faster than in MOSFETs that use conventional technologies. This note examines the advantages of using HDTMOS transistors as synchronous rectifiers in a high power buck converter, and in a 5V DC to 3.3V DC buck converter, in order to increase circuit performance and efficiency while minimising parts count.	pdf
AN1540	D	*Application Consideration Using Insulated Gate Bipolar Transistors IGBTs*	Many of the problems associated with paralleling of power devices can be greatly reduced by using IGBTs. It has been shown that the device characteristics of the IGBT device favors parallel operation as opposed to BJTs. Its dual device characteristics can be utilized to give design engineers very satisfactory performance under static and dynamic current sharing of the devices.	pdf
AN1541	D	*Introduction to Insulated Gate Bipolar Transistors*	The ideal switch for use in power conversion applications would have zero voltage drop in the ON state, infinite resistance in the OFF state, would switch with infinite speed and not need any power to make it operate. In practice, the designer must make a compromise and choose a device that suits the application with minimal loss of efficiency. Combining the low conduction losses of a BJT with the switching speed of a power MOSFET would create an optimal solid state switch. The Insulated Gate Bipolar Transistor (IGBT) offers a combination of these attributes. This note explains how it is made, how it works, and how it compares with BJTs and power MOSFETs.	pdf
AN1542	D	*Active Inrush Current Limiting Using MOSFETs*	The input filter of a power supply is an integral part of the design. Typically it incorporates an inductor and capacitors ‹ these need to be able to provide EMI reduction and to hold up the supply in the case of a short duration line dropout, requirements which can lead to large capacitors being used, coupled with a large and heavy inductor to limit the inrush current. This note presents an innovative method of inrush current limiting which is based on a single MOSFET and a small number of other components. Design methods and simple equations are described, plus proposals for applications of the same circuit in other areas.	pdf

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AN1543	D	*Electronic Lamp Ballast Design*	Although the light output of a fluorescent tube has a discontinuous spectrum, the higher efficiency brought about by electronic control makes it the best choice for energy-saving lighting systems. Until recently the lack of reliable and efficient power transistors made the design of electronic ballasts difficult - now there are transistors designed specifically for lighting applications. This comprehensive application note discusses the design criteria for electronic ballast design, including safety circuits and power factor correction, and presents demonstration circuits for a full featured electronic ballast and for a dimmable version.	pdf
AN1547	D	*A DC to DC Converter for Notebook Computers Using HDTMOS and Synchronous Rectification*	A prime issue for low output voltage power supplies is power loss in the power semiconductors. This is especially true for notebook computers which need High Cell Density TMOS (HDTMOS) ‹ the latest technology ‹ to meet their high efficiency PSU requirements. Logic supplies are currently standardizing on 3.3V, forcing power supply designers to look at devices other than junction diodes for rectification. Low on-resistance power MOSFETs using HDTMOS technology can overcome the problems of poor performance, low PIV and slow reverse recovery times. This note discusses the theory and practice of a 5V to 3.3V, 4A DC to DC converter with up to 92% efficiency.	pdf
AN1560	L	*Low Voltage ECLinPS SPICE Modeling Kit*	This document extends to the low voltage family of ECLinPS and ECLinPS Lite devices the information given in AN1503: ECLinPS I/O SPICE Modelling Kit. The Low Voltage ECLinPS and ECLinPS Lite devices are the newest additions to Motorola's highest performance ECL/PECL family, offering similar performance to the standard ECLinPS and ECLinPS Lite products, but at 3.3V. The kit contains all the input and output schematics for the Low Voltage devices that are available at the time of writing, and allows a system level interconnect simulation to be performed.	pdf
AN1568	L	*Interfacing Between LVDS and ECL*	LVDS (Low Voltage Differential Signaling) signals are used to interface between today's CMOS or BiCMOS ASICs supplied with 3.3V. LVDS signals are differential signals with a swing of 250 to 400 mV and a DC offset of 1.2V. External components are required for board to board data transfer or clock distribution.	pdf

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AN1570	D	*Basic Semiconductor Thermal Measurement*	This application note provides basic information about power semiconductor thermal parameters, how they are measured, and how they are used. The intention is to enable the reader to better describe power semiconductors and to answer many commion questionsrelating to their power handling capability. Four key topics are covered: Understanding basic semiconductor thermal parameters; Semiconductor thermal test equipoment; Thermal parameter test procedures; Using thermal parameters to solve frequently asked thermal questions.	pdf
AN1576	D	*Reduce Compact Fluorescent Cost with Motorola's IGBTs for Lighting*	Compact Fluorescent Lamps (CFL) are becoming more popular in the consumer market because of their energy savings compared to incandescent lamps. Today's focus for manufacturers is to reduce the costs and miniaturize the circuits associated with these low pressure lampos in order to make them more attractive to the comsumer. Although there are many solutions for CFL drive circuits, virtually all the electronic ballasts use the half bridge topology described here. The IGBT (Insulated Gate Bipolar Transistor) is designed specifically for CFL applications.	pdf
AN1577	D	*Motorola's D2 Series Transistors for Fluorescent Converters*	The aim of the D2 series is to drastically simplify the design of electronic ballasts for fluorescent tubes. This is p[ossible due to the integration of two extra devices (D2); a freewheeling diode and an anti-saturation network. This application note presents the interest of the D2 structure and how to utilize this new series to solve the critical issues than the designer must deal with.	PDF
AN1578	L	*MECL 10H SPICE Kit for Berkeley SPICE (PSPICE)*	Presents SPICE parameters and schematics for a particular set of MC10H MECL devices for use with Berkeley SPICE Type simulators (PSPICE). The devices are MC10H101, MC10H102, MC10H103, MC10H104, MC10H105, MC10H116, MC10H131, MC10H188, MC10H189, MC10H210 and MC10H211.	pdf
AN1593	A	*Low Cost 1.0 A Current Source for Battery Chargers*	This paper describes two designs of low cost current sources for battery charger applications based on the LM2575-ADJ switching step-down converter and the MC33341 regulator control circuit.	pdf

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AN1594	A	*Critical Conduction Mode, Flyback Switching Power Supply Using the MC33364*	This application note presents a way of designing an AC-DC flyback converter that is operating in the critical conduction current mode, using the MC33364. The first section describes the main differences of operation between fixed frequency and critical conduction current mode flyback converters. The second section describes the design of a typical converter, including the design of the transformer.	pdf
AN1596	L	*ECLinPS Lite Translator ELT Family SPICE I/O Model Kit*	The objective of this kit is to provide customers with enough schematic and SPICE parameter information to perform system level interconnect modeling with the Motorola ECLinPS Lite Translator ELT family. The ELT devices MC10ELT2xD and MC100ELT2xD are single or dual supply 1 or 2 Bit translators between the TTL and ECL world. Single supply devices translate between TTL and PECL, dual supply devices translate to or from negative supplied ECL. All devices are designed as 100K compatible 100ELT2x or as 10H compatible 10ELT2x.	pdf
AN1598	L	*H124, 125, 350-352 Translator I/O SPICE Modelling Kit*	This application note provides the SPICE information necessary to accurately model system interconnect situations for designs which utilize the translator circuits of the MECL10KH family. The note includes information on the H124, H125, H350, H351, and H352 translators.	pdf
AN1601	D	*Efficient Safety Circuit for Electronic Ballast*	The self oscillant circuit, commonly used in the low cost half bridge converter, is prone to thermal runaway when the fluo-rescent lamp does not strike. As a consequence, either the switches are over sized to sustain such a fault condition, or the circuit includes a safety network to avoid this risk. Although several schematics are usable to perform such a function, the one described in this paper is easy to implement and does not influence the normal operation of the converter.	pdf
AN1607	D	*ITC122 Low Voltage Micro to Motor Interface*	A MOSFET power stage that is designed to run Brush or Brushless DC motors with input signals from an ASB124 Motion Control Development Board is presented here. It will supply up to 4 amps continuous current from DC bus voltages up to 48 volts.	pdf
AN1626	D	*Noise Management in Motor Drives*	No abstract available	pdf

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AN1631	D	*Using PSPICE to Analyze Performance of Power MOSFETs In Step-Down, Switching Regulators Employing Sychronous Rectification*	This paper will describe an easy method to analyze performance of various power MOSFETs in step down switching regulators using the PSPICE circuit analysis tool. A comparison will be made between circuit simulation results and the measured performance described in Motorola Application Note AN1520. The utility of having a model which closely simulates switching performance is that different MOSFETs and diodes can be used in the model and comparisons can be made for proper performance vs. price, size, etc. prior to building breadboards. Actual hardware should always be used to verify performance, but a good simulation model gives the designer a means of trying various combinations of parts quickly to see how well they work in a particular circuit.	pdf
AN1644	L	*Motorola's LCX SPICE Modeling Kit*	This application note provides SPICE Modeling information for Motorola's MC74LCX245 and MC74LCX16244 devices.	pdf
AN1650	L	*Using Wire-OR Ties in ECLInPSTM Designs*	This application note discusses the use of wire-OR ties in ECLinPS designs. Theoretical descriptions of the problems associated with wire-OR ties are included as well as an evaluation and SPICE simulation results. In addition, general guidelines and recommendations are provided to assist the system designer in successfully using wire-OR ties in ECLinPS designs.	pdf
AN1661	D	*Low Cost Universal Motor Chopper Drive System*	This application note describes the design of low cost chopper motor control drive system based on the MC68HC705MC4 microcontroller, MGP7N60E IGBT (Insulated Gate Bipolar Transistor) and the MSR860 Ultra Fast Soft Diode.	pdf

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AN1662	D	*Low Cost Universale Motor Phase Angle Drive System*	This application note describes the design of a low cost phase angle motor control drive system based on the MC68HC05JJ6/ MC68HC705JJ7 microcontroller and the MAC4DC snubberiess triac. The low cost single-phase power board is dedicated for universal brushed motors operating from1000 rpm to 15,000 rpm. The operational mode, which is used in this application, is closed loop and regulated speed. This mode requires a speed sensor on the motor shaft. Such a sensor isusually a tachometer generator. The kind of motor and its drive have a high impact on many home appliance features: like cost, size, noise and efficiency. Electronic control is usually necessary when variable speed or energy savings are required.	pdf
AN1663	D	*Low Cost Universal Motor Sensorless Phase Angle Drive System*	This application note describes the design of a low cost phase angle motor control drive system based on the MC68HC05JJ6/ MC68HC705JJ7 microcontroller and the MAC4DC snubberless triac.	pdf
AN1669	A&D	*MC44603 in a 110W Output SMPS Application*	The purpose of this application note is to present a way of designing the MC44603 in a fly-back dedicated to a 110 W output power supply in twodistinct cases: 110 Vrms mains and 220 Vrms mains. For this range of power, the discontinuous mode must be chosen as it limits the stress on the power switch and the out-put diodes. This kind of working can be guaranteed, thanks to the demagnetization arrangement of the MC44603. This application note considers both high and low mains voltages. In the high voltage a.c. line case, it deals with both MOSFET and BIPOLAR transistor use. In the low mains voltage case, only the MOSFET solution is considered as the inductor peak current is high.	pdf

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Page 14

Document Number	Product Class	Title	Abstract	PDF or Mfax
AN1672	L	*The ECL Translator Guide*	ECL - TTL - PECL - LVECL - LVPECL - CMOS - LVTTL How To Make Them Talk To Each Other - Are You Designing with Different I/O Levels? This document guides you to the appropriate interface. For interfacing between ECL devices and the TTL / CMOS world discrete interfaces could be used. But the switching points are usually not controlled and may vary with tempera-ture, device variation, or supply voltage. This results in duty cycle variation. To avoid this signal quality uncertainty translating devices with controlled switching levels and specified propagation delays and skews are available.	pdf
AN1677	A	*Get Your Best From Your LDO Designs*	This article contains details new high performance regulators thus giving you the ability to predict behaviors when dropped into the final circuit. This learning stage is essential when design cycles could be as low as 6 months.	pdf
AN211A	D	*Field Effect Transistors in Theory and Practice*	There are two types of field-effect transistor: the Junction Field-Effect Transistor (JFET) and the Metal Oxide Semiconductor Field-Effect Transistor (MOSFET). The principles on which these devices operate are very similar, the main difference being in the method by which the control element is made. This difference, however, results in a considerable difference in device characteristics and necessitates different approaches in circuit design. This discussion of the basic theory, construction methods, characteristics and figures of merit of the two types is intended as a primer for engineers and technicians.	Mfax
AN220	D	*FETs in Chopper and Analog Switching Circuits*	The author's discussion begins with elementary chopper and analog switch characteristics, explores fully the considerations required for conventional and FET chopper and analog switch design, and finishes with specific FET circuit examples.	Mfax

Document Number	Product Class	Title	Abstract	PDF or Mfax
AN222A	D	*The ABCs of DC to AC Inverters*	Transistor DC to AC inverters are useful in a wide variety of applications, including satellites, gyros, other airborne instruments, and even an electric shaver in a car. They may become increasingly important and more widely used with the further development of economic low-voltage DC power sources such as solar cells, nuclear cells and fuel cells. This note provides a thorough examination of a broad range of inverter types, and includes selection of the proper inverter for a specific application and device selection for inverter design.	Mfax
AN294	D	*Unijunction Transistor Timers and Oscillators*	Twelve different unijunction transistor circuits are examined, loading factors are discussed and the effects of compensating techniques are shown.	Mfax
AN462	D	*FET Current Regulators ‹ Circuits and Diodes*	A brief historical sketch of the development of two-terminal current regulators from vacuum tube days to the present. Included are numerous FET current sourcing circuits, along with an extensive treatment of the current regulating diode and its uses as a valuable component in circuit design.	Mfax
AN479	D	*Universal Input Voltage Range Power Supply for High Resolution Monitors with Multi-Sync Capability*	This note describes an easy-to-build, high performance, low cost 100W flyback power supply, able to work on any mains supply from 85Vac to 265Vac, and from 40Hz to 100Hz. It is automatically synchronised to the horizontal scanning frequency for minimum screen interference on a multi-sync colour monitor. It uses a low cost MC44602P2 current mode controller ‹ designed specifically for driving high voltage bipolar transistors ‹ with an MJH18010 switchmode power transistor.	Mfax
AN485	D	*High-Power Audio Amplifiers with Short-Circuit Protection*	This application note describes a recommended circuit approach for high-performance audio amplifiers in the 35W to 100W r.m.s. power range. Circuitry is included which enables the amplifier to operate safely continuously under any load condition including a short.	Mfax

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Page 16

Document Number	Product Class	Title	Abstract	PDF or Mfax
AN556	L	*Interconnection Techniques for Motorola's MECL 10,000 Series Emitter Couple Logic*	The MECL 10,000 Series is designed to be the most usable very high speed logic available. It satisfies the growing need for high clock rate capability and short propagation delays with minimum layout constraints. This comprehensive note describes some characteristics of high speed digital signal lines and the wiring rules for MECL 10,000. Discussions include PCB interconnects and wirewrapping techniques.	Mfax
AN569	D	*Transient Thermal Resistance Ñ General Data and its Use*	Data illustrating the thermal response of a number of semiconductor die and package combinations are given. Its use, employing the concepts of transient thermal resistance and superposition, permit the circuit designer to predict semiconductor junction temperature at any point in time during application of a complex power pulse train.	Mfax
AN581	L	*An MSI 500MHz Frequency Counter Using MECL and MTTL*	The design of an MSI 8-digit LED readout 500MHz counter using MECL III, MECL 10,000 and TTL is discussed. Described are two prescalers using MECL, along with the designs for two input amplifiers. A unique time-base controller is also shown for providing a multiphase clock to the counter.	Mfax
AN587	A	*Analysis and Design of the Op Amp Current Source*	Voltage-controlled current sources based on operational amplifiers are both versatile and accurate, yet the quality of op amps required is unimportant. This note develops general expressions for basic transfer function and output impedance, and shows that simplified equations give a very accurate description of actual circuit performance. Includes a section on analysis of the errors that result from changes in circuit parameters and temperature.	Mfax
AN701	L	*Understanding MECL 10 000 DC and AC Data Sheet Specifications*	The DC and AC specifications for emitter-coupled logic are somewhat different to those for saturated logic. This application note describes the specifications found on a MECL 10,000 data sheet and provides information for understanding these specifications for persons unfamiliar with emitter-coupled logic.	Mfax

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Document Number	Product Class	Title	Abstract	PDF or Mfax
AN703	A	*Designing Digitally-Controlled Power Supplies*	This application note shows two design approaches; a basic low voltage supply using an inexpensive MC1723 voltage regulator and a high current, high voltage supply using the MC1466 floating regulator with optoelectronic isolation. Various circuit options are shown to allow the designer maximum flexibility in an application.	Mfax
AN719	unk	*A New Approach to Switching Regulators*	This article describes a 24 volt, 3 ampere switching mode supply. It operates at 20kHz from a 120V AC line with an overall efficiency of 70%. New techniques are used to shape the load line. The control portion uses a quad comparator and an optocoupler and features short circuit protection.	Mfax
AN720	L	*Interfacing with MECL 10,000 Integrated Circuits*	This article describes some of the MECL circuits used to interface with signals not meeting MECL input or output requirements. The characteristics of these circuits, such as input impedance, output drive, gain and bandwidth, allow the designer to use these parts to optimize his system. MECL interface circuits overcome a problem area of many system designs which is the efficient coupling of non-compatible signals.	Mfax
AN726	L	*Bussing with MECL 10 000 Integrated Circuits*	High speed data bus lines are an important part of modern computer systems. Features of the MECL 10,000 family allow construction of data busses in a transmission line environment. This application note describes some of the guidelines to consider when designing high speed bus lines and shows how the MC10123 can be used for maximum bus performance.	Mfax
AN753	L	*Scanning Logic for RF Scanner-Receivers Using CMOS Integrated Circuits*	This note describes the application of CMOS integrated logic circuits in RF scanner-receiver control functions. Approaches considered include crystal switching methods with and without priority channel capability, of both the fixed and selectable priority channel types, along with reference to their applicability in phase-locked loop system designs.	Mfax
AN843	D	*A Review of Transients and Their Means of Suppression*	This note addresses the problem of transient overvoltages which most electronic equipment designs must deal with. Effective transient suppression requires that the impulse energy is dissipated in the added suppressor at a low enough voltage so the capabilities of the circuit or device will not be exceeded.	Mfax

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Document Number	Product Class	Title	Abstract	PDF or Mfax
AN849	D	*Guide to Thyristor Applications*	In this note, significant thyristor characteristics, the basis of their rating, and their relationship to circuit design are discussed.	Mfax
AN861	D	*Power Transistor Safe Operating Area: Special Considerations for Motor Drives*	Motor drives present a unique set of safe operating area conditions for power output transistors. Starting with the basics of forward and reverse safe operating area, considerations unique to motor drives are discussed. The industrial motor drive application is sufficiently different from the electronics uses of power transistors that a new safe operating area specification has been developed. It is called overload safe operating area (OSLOA). The concept and the data sheet curves that go with it are presented.	Mfax
AN873	D	*Understanding Power Transistor Dynamic Behaviour: dv/dt Effects on Switching RBSOA*	Power transistor dynamic behaviour can be affected to a large extent by dv/dt limitations. A look at the internal workings of the transistor readily shows how these limitations arise. A simple circuit model is developed which reproduces the behaviour of power transistors in dv/dt-limited modes of operation. Experience with the model gives some guidelines for minimizing dv/dt limitations in practical circuits.	Mfax
AN875	D	*Power Transistor Safe Operating Area: Special Considerations for Switching Power Supplies*	The purpose of this application note is to take a look at some of the more subtle aspects of how stress imposed by the power supply relates to transistor safe operating area, and to differentiate those stresses that the transistor can handle from those it cannot. In order to provide a proper foundation, special considerations are preceded by a review of forward bias safe operating area.	Mfax
AN876	D	*Using Power MOSFETs in Stepping Motor Control*	Stepping Motor control techniques and circuits utilizing Power MOSFETs driven from CMOS Integrated Circuits are discussed. The techniques described are shift register phase generation, comparator switched current limiting, utilization of synchronous rectification, transient current suppression by use of the Power FET transfer characteristic, and the transient voltage protection requirements of the Power FET. The techniques are presented as components for an 88% efficient stepping motor drive circuit; however they are also applicable to other power control tasks.	Mfax

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Page 19

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AN913	D	*Designing with TMOS Power MOSFETs*	Clearly, the advantages and disadvantages that the power MOSFET gives technology are its specific realm of usefulness. Some designers also favour the power MOSFET because of its extended FBSOA or its other more subtle advantages. The most common considerations that designers should be aware of when designing with TMOS power MOSFETs are outlined and explained here.	Mfax
AN915	D	*Characterizing Collector-to-Emitter and Drain-to-Source Diodes for Switchmode Applications*	Most power Darlington transistors and power MOSFETs contain integral Collector-to-Emitter (C-E) and Drain-to-Source (D-S) diodes which for certain inductive load applications can be used as commutating diodes. Whether these diodes are fast enough or have adequate power handling capability is addressed. Also described is a "real world" test circuit which accurately characterizes the diodes for switching times. The surge current capability and forward characteristics of a number of devices are also listed.	Mfax
AN918	D	*Paralleling Power MOSFETs in Switching Applications*	The present TDT series of application notes are updated in this note with a more detailed analysis and design guide for TMOS power MOSFET parallel applications to account for device-to-device parameter differences and responses.	Mfax
AN920	A	*Theory and Applications of the MC34063 and µA78S40 Switching Regulator Circuits*	This paper describes in detail the principle of operation of the MC34063 and µA78S40 switching regulator subsystems. Several converter design examples and numerous applications circuits with test data are included.	Mfax
AN924	D	*Measurement of Zener Voltage to Thermal Equilibrium with Pulsed Test Current*	This paper discusses the zener voltage correlation problem which sometimes exists between the manufacturer and the customer's incoming inspection. A method is shown to aid in the correlation of zener voltage between thermal equilibrium and pulse testing. A unique double-pulsed sample and hold test circuit is presented which improves the accuracy of correlation. Several zener voltages versus zener pulsed test current curves are shown for ten package styles. An appendix is attached for incoming inspection groups giving detailed information on tolerances involved in correlation.	Mfax

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AN929	D	*Insuring Reliable Performance from Power MOSFETs*	Due to their many unique advantages, power MOSFETs are being used in an increasing number of applications. To aid the circuit designer in developing reliable power MOSFET circuits, this application note examines six potential problem areas and offers suggestions for eliminating or minimizing problems in each area. In addition, as an aid to the many designers who are using power MOSFETs in switched-mode power supplies, this note includes a section on improving switching power supply circuits.	Mfax
AN930	D	*High Voltage, High Current, Non-Destructive FBSOA Testing*	This application note provides specifications for a test instrument which can be used to perform non-destructive testing of the Second Breakdown (SB) limits of the Forward Bias Safe Operating Area (FBSOA) curve. In addition this note illustrates typical SB portions of the FBSOA and temperature derating curves for various technologies.	Mfax
AN951	D	*Drive Optimization for 1.0kV Off-Line Converter Transistors*	The purpose of this application note is to take a look at how best to use these parts. Both switching time and reverse safe area are examined in several different circuit configurations.	Mfax
AN952	D	*Ultrafast Recovery Rectifiers Extend Power Transistor SOA*	The purpose of this application note is to examine the improvement in turn-on safe operating area that can be realized with ULTRAFAST clamp diodes. In order to provide a complete analysis, the ULTRAFAST results are preceded with a review of conventional design rules.	Mfax
AN964	D	*Trigger Design Ideas for DIAC Replacements*	With the reduced availability of DIACs it is necessary to find alternative triac trigger options. This note examines eight other discrete devices or combinations where the parts cost is generally the same or less than the DIAC they replace, but performance is improved.	Mfax
AN976	A	*A New High Performance Current Mode Controller Teams Up with Current Sensing Power MOSFETs*	The second-generation architecture of the MC34129 power supply control IC is shown to provide a number of advantages for current-mode supplies, notably 'lossless' sensing when used with current sensing power MOSFETs. The discussion includes subtle factors to watch out for in practical designs, and an applications example.	Mfax

Document Number	Product Class	Title	Abstract	PDF or Mfax
AND8001	L	*Odd Number Divide By Counters With 50% Outputs and Synchronous Clocks*	This application inquiries handled by the Product Applications gives opportunities to solve customer needs with new ideas and learn of ways the customer has used our devices in new applications. A couple of these calls lead to techniques of designing odd number counters with synchronous clocks and 50% outputs.	PDF
AND8002	L	*ECLinPS Lite™ and ECLinPS Plus™ Device Type and Date Code Guide*	Summary of ECLinPS Lite and ECLinPS Plus device labeling guidlines.	PDF
AND8003	UNK	*Storage and Handling of Drypacked Surface Mounted Devices (SMD)*	Provides customers with the necessary storage and handling guidelines to preclude component package cracking during solder reflow procedures.	
AR120	D	*Speeding Up the Very High Voltage Transistor*	No abstract available	Contact Marketing
AR145	D	*DPAK: The Power Package for Surface Mount Applications*	No abstract available	Contact Marketing
AR160	D	*Lossless Current Sensing with SENSEFETs Enhances Motor Drive*	No abstract available	Contact Marketing
AR175	D	*A Power FET SPICE Model From Data Sheet Specs*	No abstract available	Contact Marketing
AR180	D	*Electronic Ballasts*	No abstract available	Contact Marketing
AR181	D	*Bipolar Transistors Excel in Off-Line Resonant Converters*	No abstract available	Contact Marketing
AR300	D	*The Hidden Dangers of Electrostatic Discharge - ESD*	No abstract available	Contact Marketing

Document Number	Product Class	Title	Abstract	PDF or Mfax
AR301	D	*Solid-State Devices Ease Task of Designing Brushless DC Motors*	No abstract available	Contact Marketing
AR302	D	*Thermal Management of Surface Mount Power Devices*	No abstract available	Contact Marketing
AR323	D	*Managing Heat Dissipation in DPAK Surface-Mount Power Packages*	No abstract available	Contact Marketing
AR326	D	*High-Voltage MOSFETs Simplify Flyback Design*	No abstract available	Contact Marketing
AR340	D	*The Low Forward Voltage Schottky*	No abstract available	Contact Marketing
AR341	D	*Power MOSFET 1HP Brushless DC Motor Drive Withstands Commutation Stresses*	No abstract available	Contact Marketing
AR450	D	*Characterizing Overvoltage Transient Suppressors*	No abstract available	Contact Marketing
AR514		*Build Ultra-Low Dropout Regulator*	No abstract available	Contact Marketing
AR523	D	*An Overview of Surface Mount Technology (SMT) for Power Supply Applications*	No abstract available	Contact Marketing
AR607		*Modular DC-DC Converter Sends Power Density Soaring*	No abstract available	Contact Marketing
AR609	D	*Trouble Shooting Halogen Electronic Transformaers*	No abstract available	PDF

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Document Number	Product Class	Title	Abstract	PDF or Mfax
ARE402	D	*The Electronic Control of Fluorescent Tubes*	No abstract available	Contact Marketing
BR1487	D	*Thermal Modeling and Management of Discrete Surface Mount Packages*	This brochure details the many aspects and details of thermal modeling and management for all of the popular surface mount packages for discrete components. It also contains case outlines and footprints for all of the packages.	PDF
EB123	A	*A Simple Brush Type DC Motor Controller*	A simple and cost-effective way to drive brush type DC motors is to use power MOSFETs with a Brushless DC Motor Control IC. The low-cost MC33033 controller and integrated 8A/100V MPM3002 H-bridge combine to give a minimum parts count brush motor drive.	MFax
EB124	D	*MOSFETs Compete with Bipolars in Flyback Power Supplies*	Power MOSFETs with 400V to 500V breakdown ratings are widely used in multiple-transistor off-line power supplies. Now they can be used in flyback supplies as well, as breakdown voltages are extended to 1000V. A discussion of the advantages and disadvantages, illustrated with typical 100W MOSFET and Bipolar designs.	MFax
EB125	D	*Testing Power MOSFET Gate Charge*	Most power MOSFET manufacturers now specify Gate Charge, as well as Input Capacitance, as an indication of the drive current required to turn on the device ‹ the data can be useful in predicting switching speeds and drive losses. Commercially available gate charge test equipment is not yet widely used, and this simple tester for both N and P-channel devices is a practical alternative for smaller users.	MFax
EB126	D	*Ultra-Rapid Nickel-Cadmium Battery Charger*	Charging NiCad batteries is a particular problem when their voltage exceeds the voltage of the available charging source. The ultra-fast charger presented here is capable of charging 8 to 12 1.5 volt batteries at 1.2 to 1.8Ah in 30 to 45 minutes from a 10 to 14 volt source - a feat made possible by the use of new sintered electrode technology by battery manufacturers. Includes PC artwork and layout.	MFax

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Page 24

Document Number	Product Class	Title	Abstract	PDF or Mfax
EB128	D	*"Simple, Low-Cost Motor Controller"*	This low-cost DC motor controller uses the cost-effective MPM3002 SENSEFET-based H-Bridge, plus the MC34060 PWM IC. It is capable of driving a 1/3 HP, permanent magnet 90V DC motor, and includes dynamic braking and soft-start.	MFax
EB131	D	*Curve Tracer Measurement Techniques for Power MOSFETs*	Most curve tracers are designed to measure the parameters of bipolar transistors, but because of similarities in their characteristics, the same techniques can also be used to measure the parameters of power MOSFETs. This bulletin explains how, with particular reference to the Tektronix 370A Curve Tracer.	MFax
EB141	D	*Boost MOSFETs Drive Current in Solid State AC Relay*	MOSFETs are usually easy to drive because they are voltage controlled, but a problem arises when a power MOSFET is used as a high-side switch ‹ in applications such as AC or DC relays or H-bridge motor control circuits - because it is difficult to reference the gate drive circuit and supply to the MOSFET's Source. A clean and inexpensive solution is to use the voltage available at the Drain to drive the Gate.	MFax
EB20	A	*Multiplier/OP Amp Circuit Detects True RMS*	Mathematically, the RMS value of a function is obtained by squaring the function, averaging it over a time period and then taking the square root. In a practical sense the same technique can also be used to find the RMS value of a waveform, eliminating the thermal-response time that is prevalent in most RMS measuring circuits.	MFax
EB201	D	*High Cell Density MOSFETs*	A few years ago an affordable 60V, 10m* power transistor was only a dream (10m* is the resistance of about 20cm of #22 gauge wire). Today a sub-10m* power MOSFET is available housed in a standard TO-220 package. In addition, Motorola's high cell density technology, HDTMOS(tm), brings other advantages such as greatly improved body diode performance. The technological advances are sufficiently great that they are fundamentally changing low voltage power transistor technology. This bulletin discusses high cell density technology and its benefits for the end user.	MFax

Document Number	Product Class	Title	Abstract	PDF or Mfax
EB30	D	*Sensitive Gate SCRs - Don't Forget the Gate-Cathode Resistor*	In applications of sensitive gate SCRs, the gate-cathode resistor is an important factor. Its value affects, to varying degrees, parameters such as IGT, VDRM, dV/dt, IH, leakage current and noise immunity. This bulletin discusses these relationships and gives typical data on the performance of devices in thc 2N6236 (4A) family; similar relationships can be expected for thc 2N5060 (800mA) family.	MFax
EB407	D	*Basic Halogen Converter*	Low voltage halogen lamps are becoming increasingly popular due to their higher quality light and increased efficiency compared to incandescent lamps. Since all modern 220/12V transformers are based on an electronic step-down converter, Motorola has developed a new series of bipolar power devices that can handle the full range of power values requested for these applications. This bulletin discusses the basic converter circuit and the most common design trade-offs. Includes a short-circuit detection network.	MFax
EB85A	D	*Full-Bridge Switching Power Supplies*	A useful selection chart presenting preferred Bipolar, Power MOSFET, Rectifier and Control devices for various areas of typical 500-1000W full-bridge witching power supplies.	MFax

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REFERENCE MANUAL

A Reference Manual is a publication that contains a comprehensive system or device–specific description of the structure and function (operation) of a particular part/system; used overwhelmingly to describe the functionality of a microprocessor, microcontroller, or some other sub–micron sized device. Procedural information in a Reference Manual is limited to less than 40 percent (usually much less).

USER'S GUIDE

A User's Guide contains procedural, task–oriented instructions for using or running a device or product. A User's Guide differs from a Reference Manual in the following respects:
* Majority of information (> 60%) is procedural, not functional, in nature
* Volume of information is typically less than for Reference Manuals
* Usually written more in active voice, using second–person singular (you) than is found in Reference Manuals
* May contain photographs and detailed line drawings rather than simple illustrations that are often found in Reference Manuals

POCKET GUIDE

A Pocket Guide is a pocket–sized document that contains technical reference information. Types of information commonly found in pocket guides include block diagrams, pinouts, alphabetized instruction set, alphabetized registers, alphabetized third–party vendors and their products, etc.

ADDENDUM

A documentation Addendum is a supplemental publication that contains missing information or replaces preliminary information in the primary publication it supports. Individual addendum items are published cumulatively. Addendums end with the next revision of the primary document.

APPLICATION NOTE

An Application Note is a document that contains real–world application information about how a specific Motorola device/product is used with other Motorola or vendor parts/software to address a particular technical issue. Parts and/or software must already exist and be available.

A document called "Application–Specific Information" is not the same as an Application Note.

SELECTOR GUIDE

A Selector Guide is a tri–fold (or larger) document published on a regular basis (usually quarterly) by many, if not all, divisions, that contains key line–item, device–specific information for particular product families. Some Selector Guides are published in book format and contain previously published information.

PRODUCT PREVIEW

A Product Preview is a summary document for a product/device under consideration or in the early stages of development. The Product Preview exists only until an "Advance Information" document is published that replaces it. The Product Preview is often used as the first section or chapter in a corresponding reference manual. The Product Preview displays the following disclaimer at the bottom of the first page: "Motorola reserves the right to change or discontinue this product without notice."

ADVANCE INFORMATION

The Advance Information document is for a device that is NOT fully MC–qualified. The Advance Information document is replaced with the Technical Data document once the device/part becomes fully MC–qualified. The Advance Information document displays the following disclaimer at the bottom of the first page: "This document contains information on a new product. Specifications and information herein are subject to change without notice."

TECHNICAL DATA

The Technical Data document is for a product/device that is in full production (i.e., fully released). It replaces the Advance Information document and represents a part that is M, X, XC, or MC qualified. The Technical Data document is virtually the same document as the Product Preview and the Advance Information document with the exception that it provides information that is unavailable for a product in the early phases of development (such as complete parametric characterization data). The Technical Data document is also a more comprehensive document that either of its earlier incarnations. This document displays no disclaimer, and while it may be informally referred to as a "data sheet," it is not labeled as such.

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An Engineering Bulletin is a writeup that typically focuses on a single specific solution for a particular engineering or programming issue involving one or several devices.

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