

# TMOS Power MOSFETs Products

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## In Brief . . .

Motorola continues to build a world class portfolio of TMOS Power MOSFETs with new advances in silicon and packaging technology. The following new advances have been made in the area of silicon technology.

- New high voltage devices with voltages up to 1200 volts.
- New High Cell Density (HDTMOS) family of standard and Logic Level devices in both N and P-channel are available in DPAK, D<sup>2</sup>PAK, TO-220 and SO-8 surface mount packages and in the industry standard TO-220 package.
- New TMOS V fifth generation of Motorola Power MOSFET technology. This is a new processing technique that more than doubles the present cell density of our MOSFET devices.
- New Micro8 package is the smallest power MOSFET surface mount package.
- New EZFET™ surface mount power MOSFETs incorporate back to back zener diodes across the gate-to-source to enhance ESD protection.
- New IGBTs with high short circuit capability in TO-220, TO-247 and TO-264 packages.

The following new advances have been made in the area of packaging technology.

- New SO-8 (MiniMOS) and SOT-223 packages to the surface mount portfolio.
- New High Power packages capable of housing very large die and higher power dissipation are now available in the TO-264 (formerly TO-3PBL) and SOT-227B (Isotop) packages.
- New D<sup>3</sup>PAK package allows the highest power dissipation of any standard, plastic surface-mount power semiconductor.

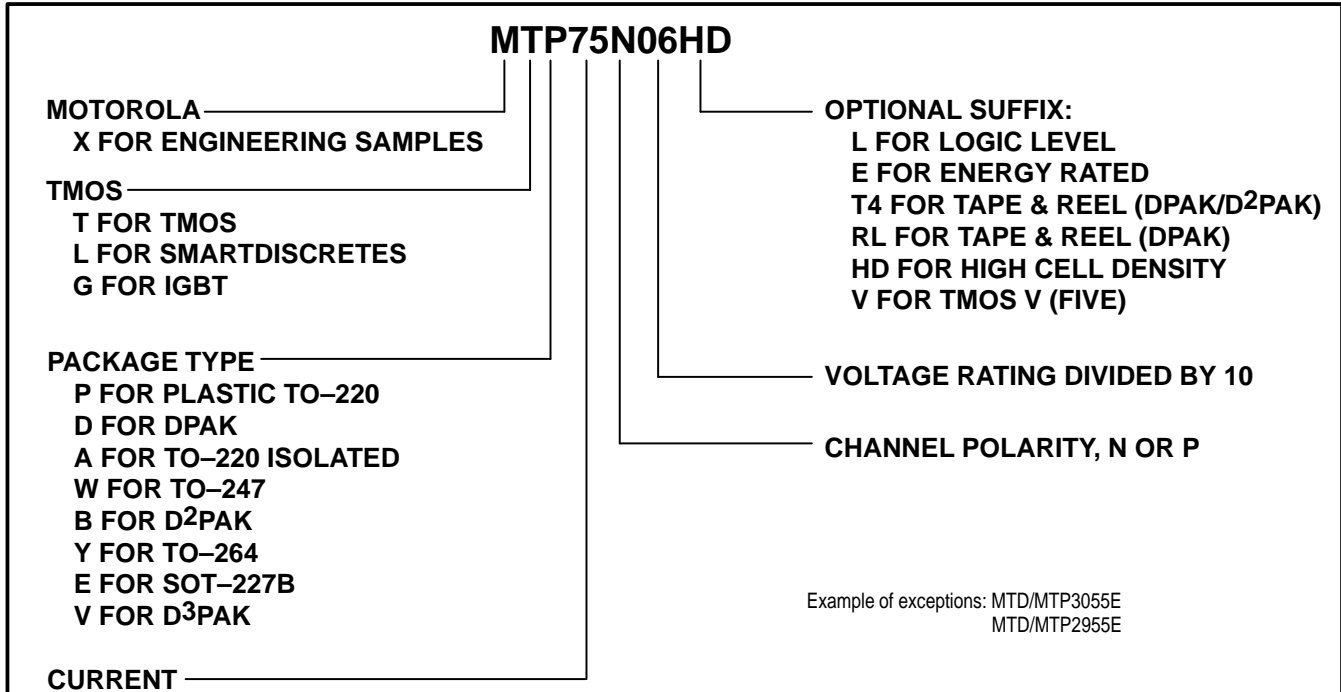
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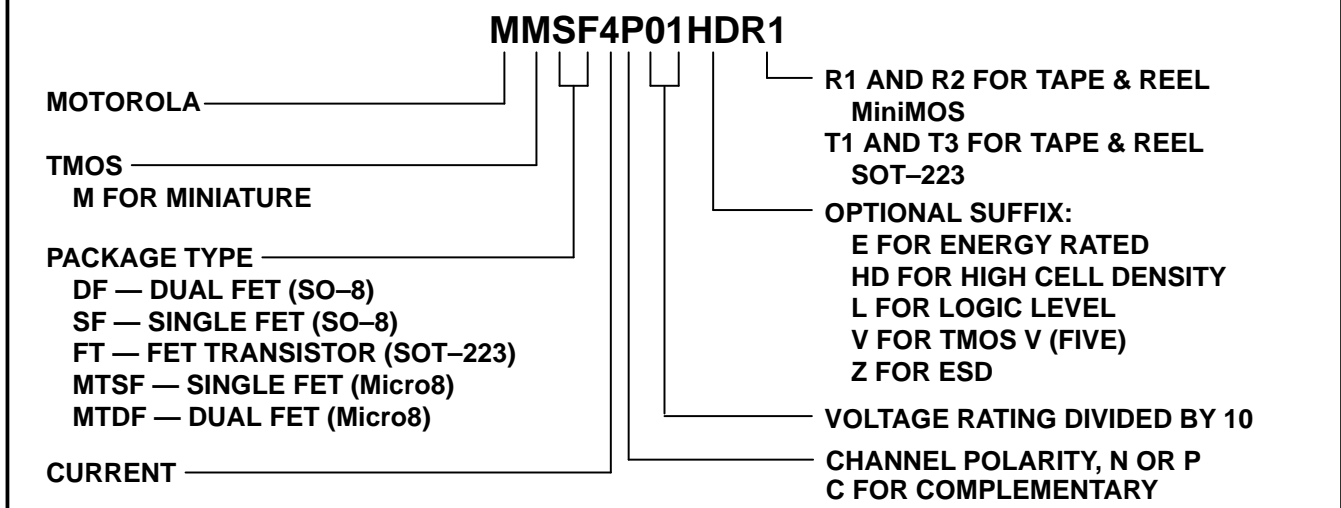
# TMOS Power MOSFETs

## TMOS Power MOSFETs Numbering System

Wherever possible, Motorola has used the following numbering systems for TMOS power MOSFET products.



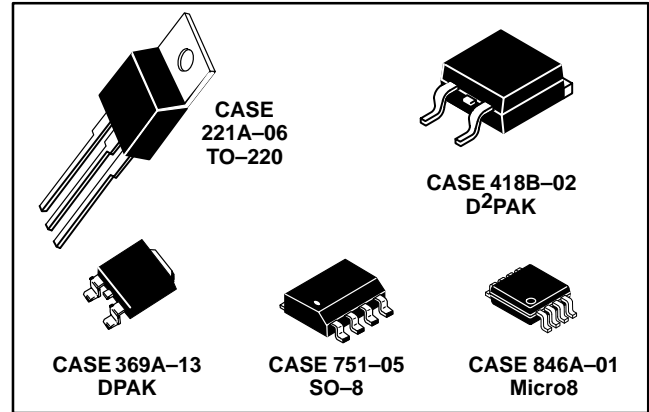
## SO-8 (MiniMOS)<sup>TM</sup>, Micro8<sup>TM</sup> and SOT-223 Power MOSFETs





# HDTMOS Power MOSFETs

## N and P-Channel



HDTMOS Technology is a design technique that reduces the on-resistance contribution in virtually every portion of the power FET. The aggressive six million cells per square inch design is easily manufactured using wafer fabrication techniques that Motorola has used for several years to manufacture highly successful 8-bit microcontrollers.

HDTMOS devices are designed for use in low voltage, high speed switching applications where power efficiency is important. Typical applications are dc-dc converters and power management in portable and battery powered products such as computers, printers, cellular and cordless phones. They can also be used for low voltage motor controls in mass storage products such as disk drives and tape drives.

Table 1. High Power

V <sub>(BR)DSS</sub> (V)	R <sub>DS(on)</sub> @ V <sub>GS</sub>			ID (A)	Motorola Part Number	Package Type
	10 V (mΩ)	5 V (mΩ)	2.7 V (mΩ)			
60	45	—	—	20	<i>MTD20N06HD</i> <sup>(4)</sup>	DPAK
	—	45	—	20	<i>MTD20N06HDL</i> <sup>(4)</sup>	DPAK
	—	150	—	15	<i>MTD20P06HDL</i> <sup>(4)(5)</sup>	DPAK
	10	—	—	75	<i>MTB75N06HD</i> <sup>(4)</sup>	D <sup>2</sup> PAK
	14	—	—	60	<i>MTB60N06HD</i> <sup>(4)</sup>	D <sup>2</sup> PAK
	10	—	—	75	<i>MTP75N06HD</i>	TO-220
	14	—	—	60	<i>MTP60N06HD</i>	TO-220
50	9.50	—	—	75	<i>MTP75N05HD</i>	TO-220
	9.50	—	—	75	<i>MTB75N05HD</i> <sup>(4)</sup>	D <sup>2</sup> PAK
30	—	35	—	20	<i>MTD20N03HDL</i> <sup>(4)</sup>	DPAK
	—	99	—	19	<i>MTD20P03HDL</i> <sup>(4)(5)</sup>	DPAK
	6.0	7.5	—	75	<i>MTB75N03HDL</i> <sup>(4)</sup>	D <sup>2</sup> PAK
	—	30	—	50	<i>MTB50P03HDL</i> <sup>(4)(5)</sup>	D <sup>2</sup> PAK
	6.0	7.5	—	75	<i>MTP75N03HDL</i>	TO-220
—	30	—	50	<i>MTP50P03HDL</i> <sup>(5)</sup>	TO-220	

<sup>(4)</sup> Available in tape and reel — add T4 suffix to part number.

<sup>(5)</sup> Indicates P-Channel

Devices listed in bold, italic are Motorola preferred devices.

## HDTMOS Power MOSFETs (continued)

**Table 2. SOIC — COMPLEMENTARY, N and P–Channel**

V(BR)DSS (V)	RDS(on) @ VGS			ID (A)	Device(5)	Package Type	PD(3) (Watts) Max
	10 V (mΩ)	4.5 V (mΩ)	2.7 V (mΩ)				
50	300	500	—	1.5	<b>MMDF1N05E</b>	SO-8	1.5
30	200	300	—	2	<b>MMDF2P03HD</b>	SO-8	1.5
	100	110	—	3	<b>MMSF3P03HD</b>	SO-8	1.5
	70/200(11)	75/300(11)	—	2	<b>MMDF2C03HD</b>	SO-8	1.5
	70	75	—	2.8	<b>MMDF3N03HD</b>	SO-8	1.5
	40	50	—	5	<b>MMSF5N03HD</b>	SO-8	1.5
20	250	400	—	2	<b>MMSF2P02E</b>	SO-8	1.5
	250	400	—	2	<b>MMDF2P02E</b>	SO-8	1.5
	160	180	—	2	<b>MMDF2P02HD</b>	SO-8	1.5
	100/250(11)	200/400(11)	—	2	<b>MMDF2C02E</b>	SO-8	1.5
	100	200	—	2	<b>MMDF2N02E</b>	SO-8	1.5
	90/160(11)	100/180(11)	—	2	<b>MMDF2C02HD</b>	SO-8	1.5
	90	100	—	3	<b>MMDF3N02HD</b>	SO-8	1.5
	75	95	—	3	<b>MMSF3P02HD</b>	SO-8	1.5
	25	40	—	5	<b>MMSF5N02HD</b>	SO-8	1.5
12	—	180	220	2	<b>MMDF2P01HD</b>	SO-8	1.5
	—	100	110	4	<b>MMSF4P01HD</b>	SO-8	1.5
	—	45/180(11)	55/220(11)	2	<b>MMDF2C01HD</b>	SO-8	1.5
	—	45	55	4	<b>MMDF4N01HD</b>	SO-8	1.5

(3) Power rating when mounted on an FR-4 glass epoxy printed circuit board with the minimum recommended footprint.

(5) Available in tape and reel only — R1 suffix = 500/reel, R2 suffix = 2500/reel.

(11) N–Channel/P–Channel RDS(on)

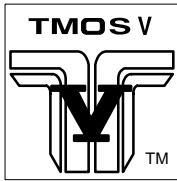
**Table 3. EZFET**

V(BR)DSS (Volts) Min	Device	Description	RDS(on) (mΩ) Max	@ VGS (Volts)	ID (cont) Amps	VGS (Volts) Max	Package
20	<b>MMSF3P02Z</b>	Single P–Channel	75	10	3	±15	SO-8
			90	4.5			
	<b>MMSF4P01Z</b>	Single N–Channel	70	4.5	4	±8	
			90	2.7			
	<b>MMSF6N01Z</b>	Dual N–Channel	25	4.5	6		
			30	2.7			
30	<b>MMSF5N03Z</b>	Single P–Channel	30	10	5	±15	
				40			4.5

**Table 4. Micro8**

V(BR)DSS (Volts) Min	RDS(on) (mΩ) Max	VGS (Volts)	ID (cont) Amps	Device	Product Description
20	190	2.7	2	<b>MTSF1P02HD</b>	Single P–Channel
20	200	2.7	1.5	<b>MTDF1N02HD</b>	Dual N–Channel
30	75	4.5	3	<b>MTSF3N03HD</b>	Single N–Channel
30	225	4.5	1.5	<b>MTDF1N03HD</b>	Dual N–Channel

Devices listed in bold, italic are Motorola preferred devices.



# TMOS V

## Motorola Introduces Fifth Generation TMOS Technology

Power Products Division introduces a new technology in the low voltage TMOS transistor family. This new generation technology is currently referred to as TMOS V. It is revolutionary rather than evolutionary.

The TMOS V technology will more than double the present cell density of our TMOS Power MOSFETs. This new technology will result in a tighter overall distribution of electrical parameters and optimizes the performance of our 50 and 60 volt portfolio.

This is a high cell density process of the future that will produce a new line of industry standard devices. Power transistors can now be built with the same high resolution/small geometry MOS fabrication technology that is standard in Motorola's ASIC, microprocessor and Memory Wafer Fabs.

**Table 1. TMOS V — DPAK N-Channel**

$V_{(BR)DSS}$ (Volts) Min	$R_{DS(on)}$ (Ohms) Max	@ $I_D$ (Amps)	Device	$I_D$ (cont) Amps	$P_D$ (Watts) Max
60	0.150	6	<i>MTD3055V</i> <sup>(4)</sup>	12	1.75 <sup>(3)</sup>
	0.180	6	<i>MTD3055VL</i> <sup>(2)(4)</sup>	12	1.75 <sup>(3)</sup>
	0.120	7.5	<i>MTD15N06V</i> <sup>(4)</sup>	15	1.75 <sup>(3)</sup>
	0.120	7.5	<i>MTD15N06VL</i> <sup>(2)(4)</sup>	15	1.75 <sup>(3)</sup>
	0.100	10	<i>MTD20N06V</i> <sup>(4)</sup>	20	1.75 <sup>(3)</sup>

**Table 2. TMOS V — TO-220AB N-Channel**

$V_{(BR)DSS}$ (Volts) Min	$R_{DS(on)}$ (Ohms) Max	@ $I_D$ (Amps)	Device	$I_D$ (cont) Amps	$P_D$ (Watts) Max
60	0.150	6	<i>MTP3055V</i>	12	48 <sup>(1)</sup>
	0.180	6	<i>MTP3055VL</i> <sup>(2)</sup>	12	48 <sup>(1)</sup>
	0.120	7.5	<i>MTP15N06V</i>	15	55 <sup>(1)</sup>
	0.120	7.5	<i>MTP15N06VL</i> <sup>(2)</sup>	15	65 <sup>(1)</sup>
	0.100	10	<i>MTP20N06V</i>	20	65 <sup>(1)</sup>
	0.040	16	<i>MTP36N06V</i>	32	90 <sup>(1)</sup>
	0.050	15	<i>MTP30N06VL</i> <sup>(2)</sup>	30	90 <sup>(1)</sup>
	0.028	21	<i>MTP50N06V</i>	42	125 <sup>(1)</sup>
	0.032	21	<i>MTP50N06VL</i> <sup>(2)</sup>	42	125 <sup>(1)</sup>
	0.024	26	<i>MTP52N06V</i>	52	135 <sup>(1)</sup>
	0.028	26	<i>MTP52N06VL</i> <sup>(2)</sup>	52	135 <sup>(1)</sup>

(1)  $T_C = 25^\circ\text{C}$

(2) Indicates logic level

(3) Power rating when mounted on an FR-4 glass epoxy printed circuit board with the minimum recommended footprint.

(4) Available in tape and reel — add T4 suffix to part number.

Devices listed in bold, italic are Motorola preferred devices.

## TMOS V (continued)

**Table 3. TMOS V — D<sup>2</sup>PAK N-Channel**

V <sub>(BR)DSS</sub> (Volts) Min	R <sub>DS(on)</sub> (Ohms) Max	@ I <sub>D</sub> (Amps)	Device	I <sub>D</sub> (cont) Amps	P <sub>D</sub> (Watts) Max
60	0.120	7.5	<i>MTB15N06V</i> <sup>(4)</sup>	15	3.0 <sup>(3)</sup>
	0.120	7.5	<i>MTB15N06VL</i> <sup>(2)(4)</sup>	15	3.0 <sup>(3)</sup>
	0.100	10	<i>MTB20N06V</i> <sup>(4)</sup>	20	3.0 <sup>(3)</sup>
	0.040	16	<i>MTB36N06V</i> <sup>(4)</sup>	32	3.0 <sup>(3)</sup>
	0.050	15	<i>MTB30N06VL</i> <sup>(2)(4)</sup>	30	3.0 <sup>(3)</sup>
	0.028	21	<i>MTB50N06V</i> <sup>(4)</sup>	42	3.0 <sup>(3)</sup>
	0.032	21	<i>MTB50N06VL</i> <sup>(2)(4)</sup>	42	3.0 <sup>(3)</sup>
	0.024	26	<i>MTB52N06V</i> <sup>(4)</sup>	52	3.0 <sup>(3)</sup>
0.028	26	<i>MTB52N06VL</i> <sup>(2)(4)</sup>	52	3.0 <sup>(3)</sup>	

**Table 4. TMOS V — SOIC-8**

V <sub>(BR)DSS</sub> (Volts) Min	R <sub>DS(on)</sub> (Ohms) Max	@ I <sub>D</sub> (Amps)	Device	I <sub>D</sub> (cont) Amps	P <sub>D</sub> (Watts) Max
60	0.150	0.85	<i>MMDF3055V</i> <sup>(4)</sup>	1.7	1.8 <sup>(3)</sup>
	0.180	0.75	<i>MMDF3055VL</i> <sup>(2)(4)</sup>	1.5	1.8 <sup>(3)</sup>

**Table 5. TMOS V — SOT-223**

V <sub>(BR)DSS</sub> (Volts) Min	R <sub>DS(on)</sub> (Ohms) Max	@ I <sub>D</sub> (Amps)	Device	I <sub>D</sub> (cont) Amps	P <sub>D</sub> (Watts) Max
60	0.150	0.85	<i>MMFT3055V</i> <sup>(4)</sup>	1.7	0.96 <sup>(3)</sup>
	0.180	0.75	<i>MMFT3055VL</i> <sup>(2)(4)</sup>	1.5	0.96 <sup>(3)</sup>

**Table 6. TMOS V — P-Channel**

V <sub>(BR)DSS</sub> (Volts) Min	R <sub>DS(on)</sub> (Ohms) Max	@ I <sub>D</sub> (Amps)	Device	I <sub>D</sub> (cont) Amps	P <sub>D</sub> (Watts) Max
60	0.450	2.5	<i>MTD5P06V</i> <sup>(4)</sup>	5	1.75 <sup>(3)</sup>
	0.450	2.5	<i>MTP5P06V</i>	5	40 <sup>(1)</sup>
	0.300	6	<i>MTD2955V</i> <sup>(4)</sup>	12	1.75 <sup>(3)</sup>
	0.300	6	<i>MTP2955V</i>	12	55 <sup>(1)</sup>
	0.120	11.5	<i>MTB23P06V</i> <sup>(4)</sup>	23	3.0 <sup>(3)</sup>
	0.120	11.5	<i>MTP23P06V</i>	23	90 <sup>(1)</sup>
	0.080	15	<i>MTP30P06V</i>	30	125 <sup>(1)</sup>
	0.080	15	<i>MTB30P06V</i> <sup>(4)</sup>	30	3.0 <sup>(3)</sup>

(1) T<sub>C</sub> = 25°C

(2) Indicates logic level

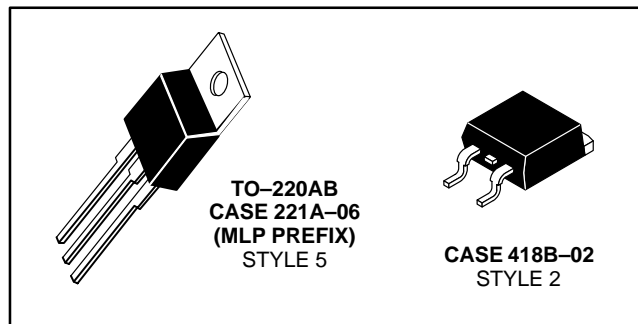
(3) Power rating when mounted on an FR-4 glass epoxy printed circuit board with the minimum recommended footprint.

(4) Available in tape and reel — add T4 suffix to part number.

Devices listed in bold, italic are Motorola preferred devices.



# SMARTDISCRETES Products



From a standard power MOSFET process, several active and passive elements can be obtained that provide on-chip protection to the basic power device. Such elements require only a small increase in silicon area and/or the addition of one masking layer to the process. The resulting device exhibits significant improvements in ruggedness and reliability and a system cost reduction. These SMARTDISCRETES™ functions can now provide an economical alternative to smart power ICs for power applications requiring low on-resistance, high voltage and high current.

These devices make up a series of “smart” power devices that automatically clamp spikes in automotive ignition systems and guard against ESD. The devices feature a logic level IGBT (Insulated Gate Bipolar Transistor) with integral active collector clamp and ESD gate protection and are designed primarily as ignition coil drivers to withstand high current in a pulsed mode without latching.

**Table 1. Ignition IGBTs**

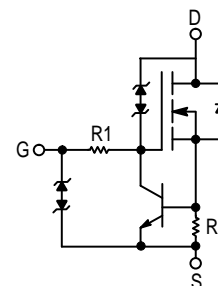
<b>B<sub>V</sub>CES (Volts) Clamped</b>	<b>V<sub>CE(on)</sub> @ 10 A</b>	<b>Device</b>	<b>P<sub>D</sub>(1) (Watts) Max</b>	<b>Package</b>
140 V	1.8	<b><i>MGP20N14CL</i></b>	150	TO-220AB
350 V	1.8	<b><i>MGP20N35CL</i></b> <b><i>MGB20N35CL</i></b>	150 2.5(3)(4)	TO-220AB D <sup>2</sup> PAK
400 V	1.8	<b><i>MGP20N40CL</i></b> <b><i>MGB20N40CL</i></b>	150 2.5(3)(4)	TO-220AB D <sup>2</sup> PAK

(1) T<sub>C</sub> = 25°C

(3) Power rating when mounted on an FR-4 glass epoxy printed circuit board with the minimum recommended footprint.

(4) DPAK and D<sup>2</sup>PAK packages available in tape and reel — add T4 suffix to part number.

The MLP1N06CL is a SMARTDISCRETES device that has integrated on-chip current limit capability, drain-to-source voltage clamping and gate voltage protection. The logic level processing allows operation of this device at half of the gate-to-source (5 volts) voltage of the conventional MOSFETs and can now be driven directly from CMOS or TTL logic drivers. This integration of technologies results in an intelligent, monolithic power circuit that offers a reduced parts count and improved reliability by replacing resistors, diodes, a bipolar transistor and a MOSFET with one device all of which are packaged in a TO-220AB package.



**MLP1N06CL**

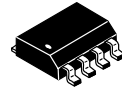
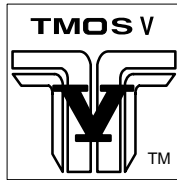
**Table 2. TO-220AB — MLP1N06CL**

<b>V<sub>(BR)DSS</sub> (Volts) Min</b>	<b>R<sub>DS(on)</sub> (Ohms) Max</b>	<b>I<sub>D</sub> (Amps)</b>	<b>Device</b>	<b>I<sub>D</sub> (cont) Amps</b>	<b>P<sub>D</sub>(1) (Watts) Max</b>
60 Clamped Voltage	0.75	1	<b><i>MLP1N06CL</i></b>	Current Limited	40
62 Clamped Voltage	0.4	2	<b><i>MLP2N06CL</i></b>	Current Limited	40

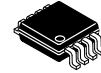
(1) T<sub>C</sub> = 25°C

(3) Power rating when mounted on an FR-4 glass epoxy printed circuit board with the minimum recommended footprint.

Devices listed in bold, italic are Motorola preferred devices.



CASE 751-05  
SO-8  
STYLE 11, STYLE 13



CASE 846A-01  
Micro8

## N-Channel

### SO-8 MiniMOS™ and Micro8 Surface Mount Products

MiniMOS devices are an advanced series of power MOSFETs which utilize Motorola's High Cell Density HDTMOS process. These miniature surface mount MOSFETs feature ultra low  $R_{DS(on)}$  and true logic level performance.

MiniMOS devices are designed for use in low voltage, high speed switching applications where power efficiency is important. Typical applications are dc-dc converters and power management in portable and battery powered products such as computers, printers, cellular and cordless phones. They can also be used for low voltage motor controls in mass storage products such as disk drives and tape drives.

- Ultra Low  $R_{DS(on)}$  Provides Higher Efficiency and Extends Battery Life
- Logic Level Gate Drive — Can Be Driven by Logic ICs
- Miniature SO-8 Surface Mount Package — Saves Board Space
- Diode Is Characterized for Use In Bridge Circuits
- Diode Exhibits High Speed, with Soft Recovery
- $I_{DSS}$  and  $V_{DS(on)}$  Specified at Elevated Temperature
- Avalanche Energy Specified

Table 1. SO-8 Products — N-Channel

$V_{(BR)DSS}$ (V)	$R_{DS(on)}$ @ $V_{GS}$			$I_D$ (A)	Device <sup>(5)</sup>	Package Type	$P_D^{(3)}$ (Watts) Max
	10 V (m $\Omega$ )	4.5 V (m $\Omega$ )	2.7 V (m $\Omega$ )				
50	300	500	—	1.5	<b><i>MMDF1N05E</i></b>	SO-8	1.5
30	40	50	—	5	<b><i>MMSF5N03HD</i></b>	SO-8	1.5
	70	75	—	2.8	<b><i>MMDF3N03HD</i></b>	SO-8	1.5
	70/200 <sup>(11)</sup>	75/300	—	2	<b><i>MMDF2C03HD</i></b>	SO-8	1.5
20	25	40	—	5	<b><i>MMSF5N02HD</i></b>	SO-8	1.5
	90	100	—	3	<b><i>MMDF3N02HD</i></b>	SO-8	1.5
	100	200	—	2	<b><i>MMDF2N02E</i></b>	SO-8	1.5
	90/160 <sup>(11)</sup>	100/180 <sup>(11)</sup>	—	2	<b><i>MMDF2C02HD</i></b>	SO-8	1.5
	100/250 <sup>(11)</sup>	200/400 <sup>(11)</sup>	—	2	<b><i>MMDF2C02E</i></b>	SO-8	1.5
12	—	45	55	4	<b><i>MMDF4N01HD</i></b>	SO-8	1.5
	—	45/180 <sup>(11)</sup>	55/220 <sup>(11)</sup>	2	<b><i>MMDF2C01HD</i></b>	SO-8	1.5

<sup>(3)</sup> Power rating when mounted on an FR-4 glass epoxy printed circuit board with the minimum recommended footprint.

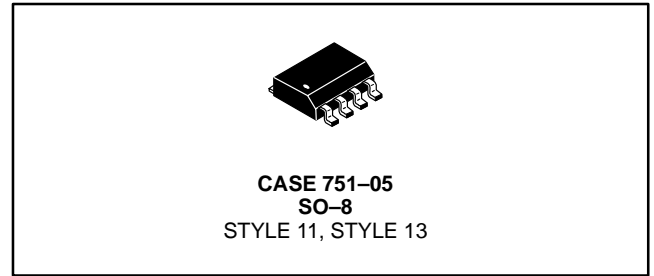
<sup>(5)</sup> Available in tape and reel only — R1 suffix = 500/reel, R2 suffix = 2500/reel.

<sup>(11)</sup> N-Channel/P-Channel  $R_{DS(on)}$

Devices listed in bold, italic are Motorola preferred devices.



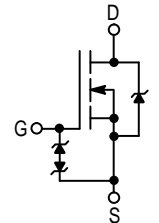
## N-Channel (continued)



## N-Channel

### SO-8 EZFET™ — Power MOSFETs with Zener Gate Protection

- New Family of Low  $R_{DS(on)}$  MOSFETs with monolithic back-to-back zener diodes across the gate to source.
- HDTMOS™ Technology (High Cell Density TMOS)
- Extremely Low  $R_{DS(on)}$  provides higher efficiency and increased battery life in portable applications



N-Channel

Table 2. EZFET

$V_{(BR)DSS}$ (Volts) Min	Device	Description	$R_{DS(on)}$ (m $\Omega$ ) Max	@ $V_{GS}$ (Volts)	$I_D$ (cont) Amps	$V_{GS}$ (Volts) Max	Package
20	<b><i>MMSF6N01Z</i></b>	Single N-Channel	25 30	4.5 2.7	6	±8	SO-8
	<b><i>MMDF4N01Z</i></b>	Dual N-Channel	45 55	4.5 2.7	4		

Table 3. Micro8

$V_{(BR)DSS}$ (Volts) Min	$R_{DS(on)}$ (m $\Omega$ ) Max	@ $V_{GS}$ (Volts)	$I_D$ (cont) Amps	Device	Product Description
20	200	2.7	1.5	<b><i>MTDF1N02HD</i></b>	Dual N-Channel
30	75	4.5	3	<b><i>MTSF3N03HD</i></b>	Single N-Channel
30	225	4.5	1.5	<b><i>MTDF1N03HD</i></b>	Dual N-Channel

## SOT-223 Medium Power MOSFETs Surface Mount Products

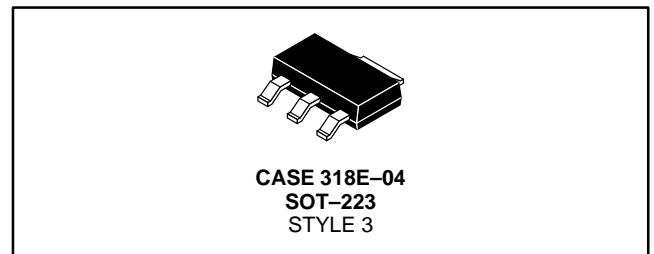


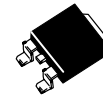
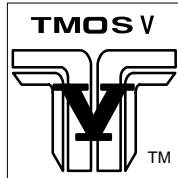
Table 4. SOT-223 Medium Power TMOS FETs — N-Channel

$V_{(BR)DSS}$ (Volts) Min	$R_{DS(on)}$ (Ohms) @ Max	$I_D$ (Amps)	Device <sup>(12)</sup>	$I_D$ (cont) Amps	$P_D$ <sup>(1)</sup> (Watts) Max	Applications
100	0.30	0.5	<b><i>MMFT1N10E</i></b>	1	0.8 <sup>(3)</sup>	dc-dc Converters Power Supplies Motor Controls, Disk Drives
60	0.18	0.75	<b><i>MMFT3055EL</i></b> <sup>(2)</sup>	1.5		
	0.15	0.85	<b><i>MMFT3055E</i></b>	1.7		
20	0.15	1	<b><i>MMFT2N02EL</i></b> <sup>(2)</sup>	2		

(1)  $T_C = 25^\circ\text{C}$   
 (2) Indicates logic level  
 (3) Power rating when mounted on an FR-4 glass epoxy printed circuit board with the minimum recommended footprint.  
 (12) Available in tape and reel only — T1 suffix = 1000/reel, T3 suffix = 4000/reel.

Devices listed in bold, italic are Motorola preferred devices.

## N-Channel (continued)



CASE 369A-13  
TO-252  
STYLE 2

## N-Channel

### DPAK Surface Mount Products

Table 5. DPAK — N-Channel

V <sub>(BR)DSS</sub> (Volts) Min	R <sub>DS(on)</sub> (Ohms) Max	@	I <sub>D</sub> (Amps)	Device (4)	I <sub>D</sub> (cont) Amps	P <sub>D</sub> (1) (Watts) Max
800	12		0.5	<i>MTD1N80E</i>	1	1.75 <sup>(3)</sup>
600	8		0.5	<i>MTD1N60E</i>	1	
500	5		0.5	<i>MTD1N50E</i>	1	
	3.60		1	<i>MTD2N50E</i>	2	
400	3.50		1	<i>MTD2N40E</i>	2	
250	1.40		1.5	<i>MTD3N25E</i>	3	
	1		2.5	<i>MTD5N25E</i>	5	
200	1.20		2	<i>MTD4N20E</i>	4	
	0.70		3	<i>MTD6N20E</i>	6	
150	0.30		3	MTD6N15	6	
100	0.60		2.5	<i>MTD5N10E</i>	5	
	0.40		3	<i>MTD6N10E</i>	6	
	0.25		4.5	<i>MTD9N10E</i>	9	
	0.22		5	<i>MTD10N10EL</i> <sup>(2)</sup>	10	
60	0.18		6	<i>MTD3055VL</i> <sup>(2)</sup>	12	
	0.15		6	<i>MTD3055V</i>	12	
	0.12		4	<i>MTD8N06E</i>	8	
	0.12		7.5	<i>MTD15N06V</i>	15	
	0.045		10	<i>MTD20N06HD</i>	20	
	0.045		10	<i>MTD20N06HDL</i> <sup>(2)</sup>	20	
50	0.10		5	<i>MTD10N05E</i>	10	
30	0.035		10	<i>MTD20N03HDL</i> <sup>(2)</sup>	20	

(1) T<sub>C</sub> = 25°C

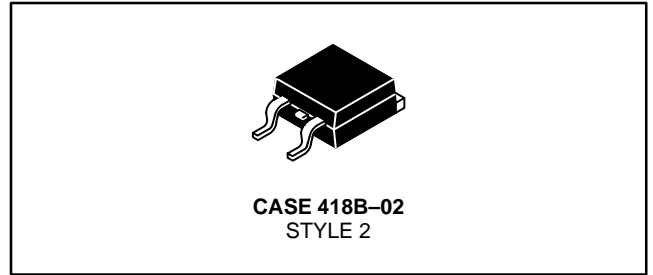
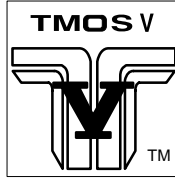
(2) Indicates logic level

(3) Power rating when mounted on an FR-4 glass epoxy printed circuit board with the minimum recommended footprint.

(4) Available in tape and reel — add T4 suffix to part number.

Devices listed in bold, italic are Motorola preferred devices.

## N-Channel (continued)



## N-Channel

### D<sup>2</sup>PAK Surface Mount Products

Table 6. D<sup>2</sup>PAK — N-Channel

$V_{(BR)DSS}$ (Volts) Min	$R_{DS(on)}$ (Ohms) Max	@	$I_D$ (Amps)	Device(4)	$I_D$ (cont) Amps	$P_D^{(1)}$ (Watts) Max
1200	5		1.5	<i><b>MTB3N120E</b></i>	3	2.5(3)
1000	9		0.5	<i><b>MTB1N100E</b></i>	1	
	4		1.5	<i><b>MTB3N100E</b></i>	3	
800	3		2	<i><b>MTB4N80E</b></i>	4	
600	1.20		3	<i><b>MTB6N60E</b></i>	6	
500	0.80		4	<i><b>MTB8N50E</b></i>	8	
400	0.55		5	<i><b>MTB10N40E</b></i>	10	
250	0.50		4.5	<i><b>MTB9N25E</b></i>	9	
	0.25		8	<i><b>MTB16N25E</b></i>	16	
200	0.16		10	<i><b>MTB20N20E</b></i>	20	
100	0.060		16.5	<i><b>MTB33N10E</b></i>	33	
60	—		—	<i><b>MTB15N06V</b></i>	—	
	0.05		15	<i><b>MTB30N06EL</b></i> (2)	30	
	0.04		16	<i><b>MTB36N06V</b></i>	36	
	0.032		21	<i><b>MTB50N06VL</b></i>	42	
	0.028		21	<i><b>MTB50N06V</b></i>	42	
	0.014		30	<i><b>MTB60N06HD</b></i>	60	
	0.01		37.5	<i><b>MTB75N06HD</b></i>	75	
50	0.0095		37.5	<i><b>MTB75N05HD</b></i>	75	
30	0.0075		37.5	<i><b>MTB75N03HDL</b></i> (2)	75	

(1)  $T_C = 25^\circ\text{C}$

(2) Indicates logic level

(3) Power rating when mounted on an FR-4 glass epoxy printed circuit board with the minimum recommended footprint.

(4) Available in tape and reel — add T4 suffix to part number.

Devices listed in bold, italic are Motorola preferred devices.

## N-Channel (continued)



## N-Channel

### D<sup>3</sup>PAK

- D<sup>3</sup>PAK is a high power surface mount package designed to accommodate die which is too large for a D<sup>2</sup>PAK.
  - Utilized for Size 5, Size 6 or larger MOSFET and IGBT.
  - Used for dual die IGBT and diode combination.
- 24 mm Tape and Reel, 500 units per 13' reel.
- D<sup>3</sup>PAK is thermal characterized for use on FR-4 and IMS board materials.
- Applications:
  - Surface mount motor drives
  - Power supplies both AC/DC and DC/DC

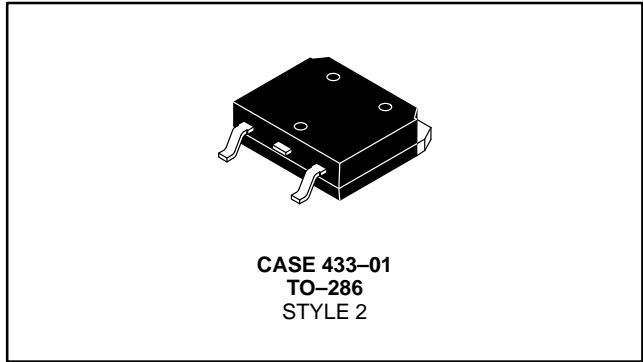


Table 7. D<sup>3</sup>PAK — N-Channel

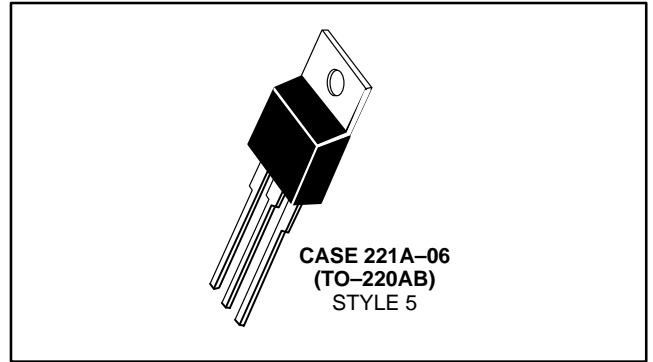
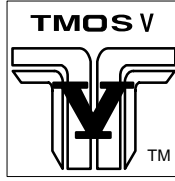
$V_{(BR)DSS}$ (Volts) Min	$R_{DS(on)}$ (Ohms) Max	@	$I_D$ (Amps)	Device <sup>(4)</sup>	$I_D$ (cont) Amps	$P_D^{(1)}$ (Watts) Max
1000	1.50		3	<i>MTV6N100E</i>	6	178
	1.30		5	<i>MTV10N100E</i>	10	250
500	0.320		8	<i>MTV16N50E</i>	16	250
	0.240		10	<i>MTV20N50E</i>	20	250
	0.200		12.5	<i>MTV25N50E</i>	25	250
250	0.065		16	<i>MTV32N05E</i>	32	250
200	0.075		16	<i>MTV32N20E</i>	32	180

<sup>(1)</sup>  $T_C = 25^\circ\text{C}$

<sup>(4)</sup> Available in tape and reel — add RL suffix to part number.

Devices listed in bold, italic are Motorola preferred devices.

## N-Channel (continued)



## N-Channel

### TO-220AB

Table 8. TO-220AB — N-Channel

$V_{(BR)DSS}$ (Volts) Min	$R_{DS(on)}$ (Ohms) Max	@	$I_D$ (Amps)	Device	$I_D$ (cont) Amps	$P_D^{(1)}$ (Watts) Max
1200	5.0		1.5	<i>MTP3N120E</i>	3	125
1000	9		0.5	<i>MTP1N100E</i>	1	75
	4.0		1.5	<i>MTP3N100E</i>	3	125
800	3		2	<i>MTP4N80E</i>	4	
600	8		0.5	<i>MTP1N60E</i>	1	50
	3.80		1	<i>MTP2N60E</i>	2	
	2.20		1.5	<i>MTP3N60E</i>	3	75
	1.20		3	<i>MTP6N60E</i>	6	125
500	5		0.5	<i>MTP1N50E</i>	1	50
	3.60		1	<i>MTP2N50E</i>	2	75
	3		1.5	<i>MTP3N50E</i>	3	50
	1.50		2	<i>MTP4N50E</i>	4	75
	0.80		4	<i>MTP8N50E</i>	8	125
400	3.50		1	<i>MTP2N40E</i>	2	50
	1.80		2	<i>MTP4N40E</i>	4	50
	1		2.5	<i>MTP5N40E</i>	5	75
	0.55		5	<i>MTP10N40E</i>	10	125
250	1.4		1	<i>MTP3N25E</i>	3	40
	0.5		4.5	<i>MTP9N25E</i>	9	75
	0.25		8	<i>MTP16N25E</i>	16	125
200	0.70		3.5	<i>MTP7N20E</i>	7	75
	0.16		10	<i>MTP20N20E</i>	20	125
100	0.25		5	<i>MTP10N10E</i>	10	75
	0.22		5	<i>MTP10N10EL</i>	10	40
	0.16		6	<i>MTP12N10E</i>	12	75
	0.070		13.5	<i>MTP27N10E</i>	27	125
	0.060		16.5	<i>MTP33N10E</i>	33	150

<sup>(1)</sup>  $T_C = 25^\circ\text{C}$

Devices listed in bold, italic are Motorola preferred devices.

## N-Channel (continued)

Table 8. TO-220AB — N-Channel (continued)

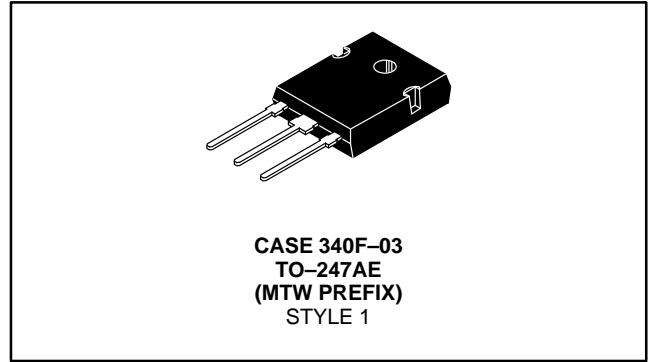
$V_{(BR)DSS}$ (Volts) Min	$R_{DS(on)}$ (Ohms) Max	@	$I_D$ (Amps)	Device	$I_D$ (cont) Amps	$P_D^{(1)}$ (Watts) Max
60	0.18		6	<i>MTP3055VL</i> <sup>(2)</sup>	12	48
	0.15		6	<i>MTP3055V</i>	12	
	0.12		7.5	<i>MTP15N06V</i>	15	60
	0.12		7.5	<i>MTP15N06VL</i>	15	65
	0.10		10	<i>MTP20N06V</i>	20	
	0.05		15	<i>MTP30N06VL</i> <sup>(2)</sup>	30	90
	0.04		18	<i>MTP36N06V</i>	32	
	0.032		25	<i>MTP50N06VL</i> <sup>(2)</sup>	50	150
	0.028		25	<i>MTP50N06V</i>	50	
	0.028		26	<i>MTP52N06VL</i>	52	135
	0.024		26	<i>MTP52N06V</i>	52	
	0.014		30	<i>MTP60N06HD</i>	60	150
	0.01		37.5	<i>MTP75N06HD</i>	75	
50	0.10		7.5	<i>MTP15N05EL</i> <sup>(2)</sup>	15	75
	0.0095		37.5	<i>MTP75N05HD</i>	75	150
25	0.0075		37.5	<i>MTP75N03HDL</i> <sup>(2)</sup>	75	

(1)  $T_C = 25^\circ\text{C}$

(2) Indicates logic level

Devices listed in bold, italic are Motorola preferred devices.

## N-Channel (continued)



## N-Channel

### TO-247 Isolated Mounting Hole

The Motorola portfolio of TO-247 devices has new on-resistance specifications on many industry standard devices with  $R_{DS(on)}$  reductions up to 25%.

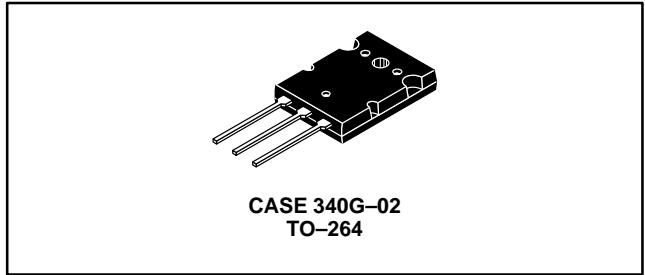
Table 9. TO-247 — N-Channel

$V_{(BR)DSS}$ (Volts) Min	$R_{DS(on)}$ (Ohms) Max	@	$I_D$ (Amps)	Device	$I_D$ (cont) Amps	$P_D^{(1)}$ (Watts) Max
1000	1.50		3	<i>MTW6N100E</i>	6	180
	1.30		5	<i>MTW10N100E</i>	10	250
800	1		3.5	<i>MTW7N80E</i>	7	180
600	0.50		4	<i>MTW8N60E</i>	8	180
500	0.32		7	<i>MTW14N50E</i>	14	180
	0.24		10	<i>MTW20N50E</i>	20	250
400	0.24		8	<i>MTW16N40E</i>	16	180
	0.16		12	<i>MTW24N40E</i>	24	250
250	0.10		16	<i>MTW32N25E</i>	32	250
200	0.075		16	<i>MTW32N20E</i>	32	180
150	0.065		17.5	<i>MTW35N15E</i>	35	180
100	0.035		22.5	<i>MTW45N10E</i>	45	180

(1)  $T_C = 25^\circ\text{C}$

Devices listed in bold, italic are Motorola preferred devices.

## N-Channel (continued)



## N-Channel

### TO-264 High Power Products

The TO-264 package is a new addition to the Motorola portfolio of high power packages. This package is capable of a power dissipation of 300 Watts and it achieves a low on-resistance with a single die. Lead spacing is compatible to the TO-247 package.

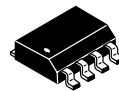
Table 10. TO-264 High Power Products — N-Channel

$V_{(BR)DSS}$ (Volts) Min	$R_{DS(on)}$ (Ohms) Max	@	$I_D$ (Amps)	Device	$I_D$ (cont) Amps	$P_D^{(1)}$ (Watts) Max
600	0.21		12.5	<b><i>MTY25N60E</i></b>	25	300
500	0.26		10	<b><i>MTY20N50E</i></b>	20	
	0.15		15	<b><i>MTY30N50E</i></b>	30	
200	0.028		27.5	<b><i>MTY55N20E</i></b>	55	
100	0.011		50	<b><i>MTY100N10E</i></b>	100	

(1)  $T_C = 25^\circ\text{C}$

Devices listed in bold, italic are Motorola preferred devices.





CASE 751-05  
SO-8  
STYLE 11, STYLE 13



CASE 846A-01  
Micro8

## P-Channel

### SO-8 (MiniMOS) and Micro8 Surface Mount Products

#### Multiple Chip TMOS Products in SOIC Surface Mount Packages

MiniMOS devices are an advanced series of power MOSFETs which utilize Motorola's High Cell Density HDTMOS process. These miniature surface mount MOSFETs feature ultra low  $R_{DS(on)}$  and true logic level performance.

MiniMOS devices are designed for use in low voltage, high speed switching applications where power efficiency is important. Typical applications are dc-dc converters and power management in portable and battery powered products such as computers, printers, cellular and cordless phones. They can also be used for low voltage motor controls in mass storage products such as disk drives and tape drives.

Table 1. SO-8 Products — P-Channel

$V_{(BR)DSS}$ (V)	$R_{DS(on)}$ @ $V_{GS}$			$I_D$ (A)	Device(5)	Package Type	$P_D^{(3)}$ (Watts) Max
	10 V (m $\Omega$ )	4.5 V (m $\Omega$ )	2.7 V (m $\Omega$ )				
30	100	110	—	3	<i>MMSF3P03HD</i>	SO-8	1.5
	200	300	—	2	<i>MMDF2P03HD</i>	SO-8	1.5
20	75	95	—	3	<i>MMSF3P02HD</i>	SO-8	1.5
	160	180	—	2	<i>MMDF2P02HD</i>	SO-8	1.5
	250	400	—	2	<i>MMDF2P02E</i>	SO-8	1.5
	250	400	—	2	<i>MMSF2P02E</i>	SO-8	1.5
12	—	100	110	4	<i>MMSF4P01HD</i>	SO-8	1.5
	—	180	220	2	<i>MMDF2P01HD</i>	SO-8	1.5

(3) Power rating when mounted on an FR-4 glass epoxy printed circuit board with the minimum recommended footprint.

(5) Available in tape and reel only — R1 suffix = 500/reel, R2 suffix = 2500/reel.

Table 2. Micro8

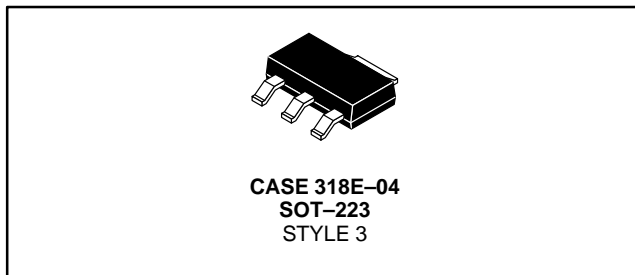
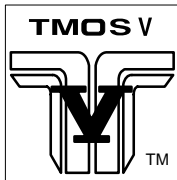
$V_{(BR)DSS}$ (Volts) Min	$R_{DS(on)}$ (m $\Omega$ ) Max	@ $V_{GS}$ (Volts)	$I_D$ (cont) Amps	Device	Product Description
20	190	2.7	2	<i>MTSF1P02HD</i>	Single P-Channel

Table 3. EZFET

$V_{(BR)DSS}$ (Volts) Min	Device	Description	$R_{DS(on)}$ (m $\Omega$ ) Max	$V_{GS}$ (Volts)	$I_D$ (cont) Amps	$V_{GS}$ (Volts) Max	Package
20	<i>MMSF3P02Z</i>	Single P-Channel	75	10	3	$\pm 15$	SO-8
			90	4.5			
	<i>MMSF4P01Z</i>		70	4.5	4	$\pm 8$	
			90	2.7			

Devices listed in bold, italic are Motorola preferred devices.

## P-Channel (continued)



## P-Channel

### SOT-223 Medium Power MOSFETs Surface Mount Products

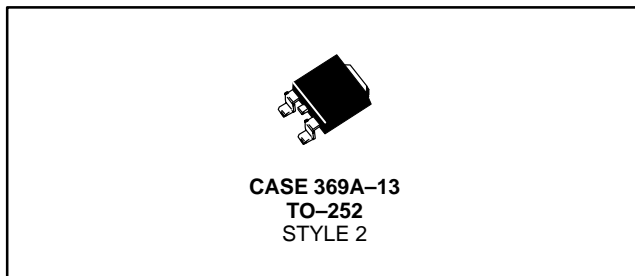
Table 4. SOT-223 Medium Power TMOS FETs — P-Channel

$V_{(BR)DSS}$ (Volts) Min	$R_{DS(on)}$ (Ohms) @ Max	$I_D$ (Amps)	Device(12)	$I_D$ (cont) Amps	$P_D^{(1)}$ (Watts) Max	Application
60	0.30	0.6	<b>MMFT2955E</b>	1.2	0.8 <sup>(3)</sup>	dc-dc Converters Power Supplies Motor Controls, Disk Drives

(1)  $T_C = 25^\circ\text{C}$

(3) Power rating when mounted on an FR-4 glass epoxy printed circuit board with the minimum recommended footprint.

(12) Available in tape and reel only — T1 suffix = 1000/reel, T3 suffix = 4000/reel.



### DPAK Surface Mount Products

Table 5. DPAK — P-Channel

$V_{(BR)DSS}$ (Volts) Min	$R_{DS(on)}$ (Ohms) Max	@	$I_D$ (Amps)	Device(4)	$I_D$ (cont) Amps	$P_D^{(1)}$ (Watts) Max
500	15.0		0.5	<b>MTD1P50E</b>	1	1.75 <sup>(3)</sup>
100	0.66		3	<b>MTD6P10E</b>	6	
60	0.55		2.5	<b>MTD5P06E</b>	5	
	—		—	<b>MTD5P06V</b>	—	
	0.15		10	<b>MTD20P06HDL<sup>(2)</sup></b>	20	
30	0.099		10	<b>MTD20P03HDL<sup>(2)</sup></b>	19	

(1)  $T_C = 25^\circ\text{C}$

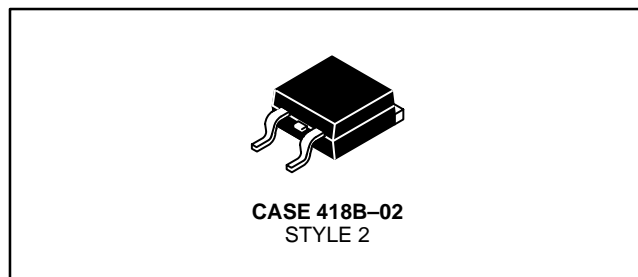
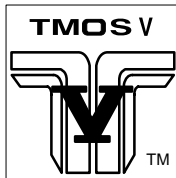
(2) Indicates logic level

(3) Power rating when mounted on an FR-4 glass epoxy printed circuit board with the minimum recommended footprint.

(4) Available in tape and reel — add T4 suffix to part number.

Devices listed in bold, italic are Motorola preferred devices.

## P-Channel (continued)



## P-Channel

### D<sup>2</sup>PAK Surface Mount Products

Table 6. D<sup>2</sup>PAK — P-Channel

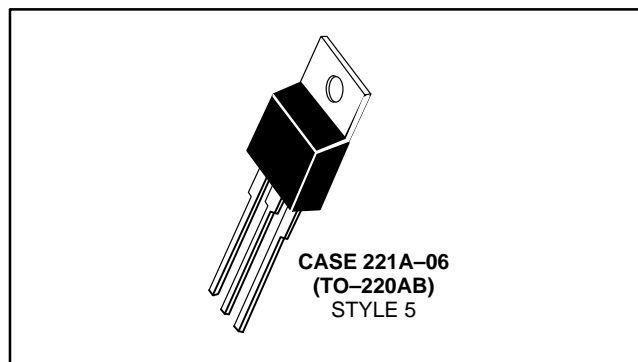
V <sub>(BR)DSS</sub> (Volts) Min	R <sub>DS(on)</sub> (Ohms) Max	@	I <sub>D</sub> (Amps)	Device (4)	I <sub>D</sub> (cont) Amps	P <sub>D</sub> (1) (Watts) Max
500	6		1	<i>MTB2P50E</i>	2	2.5(3)
60	0.12		11.5	<i>MTB23P06E</i>	23	
30	0.025		25	<i>MTB50P03HDL</i> (2)	50	

(1) T<sub>C</sub> = 25°C

(2) Indicates logic level

(3) Power rating when mounted on an FR-4 glass epoxy printed circuit board with the minimum recommended footprint.

(4) Available in tape and reel — add T4 suffix to part number.



## TO-220AB

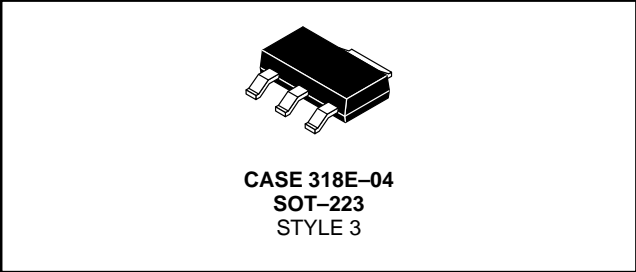
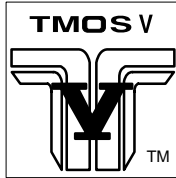
Table 7. TO-220AB — P-Channel

V <sub>(BR)DSS</sub> (Volts) Min	R <sub>DS(on)</sub> (Ohms) Max	@	I <sub>D</sub> (Amps)	Device	I <sub>D</sub> (cont) Amps	P <sub>D</sub> (1) (Watts) Max
500	6		1	<i>MTP2P50E</i>	2	75
200	1		3	<i>MTP6P20E</i>	6	
100	0.30		6	<i>MTP12P10</i>	12	88
60	0.45		2.5	<i>MTP5P06V</i>	5	40
	0.30		6	<i>MTP2955V</i>	12	60
	0.12		11.5	<i>MTP23P06V</i>	23	125
	0.08		15	<i>MTD30P06V</i>	30	125
30	0.025		25	<i>MTP50P03HDL</i> (2)	50	150

(1) T<sub>C</sub> = 25°C

(2) Indicates logic level

Devices listed in bold, italic are Motorola preferred devices.



# Logic Level — N-Channel

## SOT-223 Medium Power MOSFETs Surface Mount Products

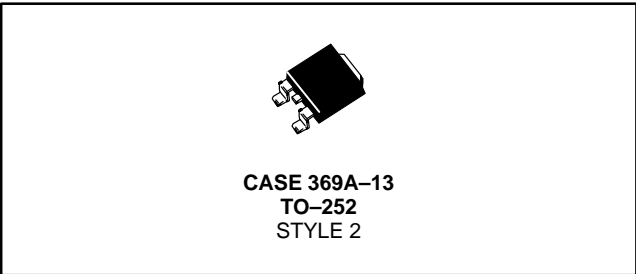
Table 1. SOT-223 Medium Power TMOS FETs — Logic Level

V <sub>(BR)DSS</sub> (Volts) Min	R <sub>DS(on)</sub> (Ohms) @ Max	I <sub>D</sub> (Amps)	Device <sup>(12)</sup>	I <sub>D</sub> (cont) Amps	P <sub>D</sub> <sup>(1)</sup> (Watts) Max	Application
60	0.18	0.75	<b>MMFT3055EL</b>	1.5	0.8 <sup>(3)</sup>	dc-dc Converters Power Supplies Motor Controls, Disk Drives
20	0.15	1	<b>MMFT2N02EL</b>	2		

(1) T<sub>C</sub> = 25°C

(3) Power rating when mounted on an FR-4 glass epoxy printed circuit board with the minimum recommended footprint.

(12) Available in tape and reel only — T1 suffix = 1000/reel, T3 suffix = 4000/reel.



# DPAK — N and P-Channel Surface Mount Products

Table 2. DPAK — Logic Level

V <sub>(BR)DSS</sub> (Volts) Min	R <sub>DS(on)</sub> (Ohms) Max	@	I <sub>D</sub> (Amps)	Device <sup>(4)</sup>	I <sub>D</sub> (cont) Amps	P <sub>D</sub> <sup>(1)</sup> (Watts) Max
100	0.22		5	<b>MTD10N10EL</b>	10	1.75 <sup>(3)</sup>
60	0.12		7.5	<b>MTD15N06V</b>	15	
	0.18		6	<b>MTD3055VL</b>	12	
	0.15		10	<b>MTD20P06HDL<sup>(5)</sup></b>	20	
	0.045		10	<b>MTD20N06HDL</b>	20	
30	0.099		10	<b>MTD20P03HDL<sup>(5)</sup></b>	19	
	0.035		10	<b>MTD20N03HDL</b>	20	

(1) T<sub>C</sub> = 25°C

(2) Indicates logic level

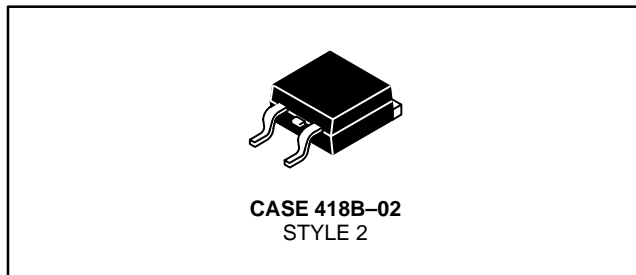
(3) Power rating when mounted on an FR-4 glass epoxy printed circuit board with the minimum recommended footprint.

(4) Available in tape and reel — add T4 suffix to part number.

(5) Indicates P-Channel

Devices listed in bold, italic are Motorola preferred devices.

## Logic Level (continued)



## Logic Level

### D<sup>2</sup>PAK — N and P-Channel Surface Mount Products

Table 3. D<sup>2</sup>PAK — Logic Level

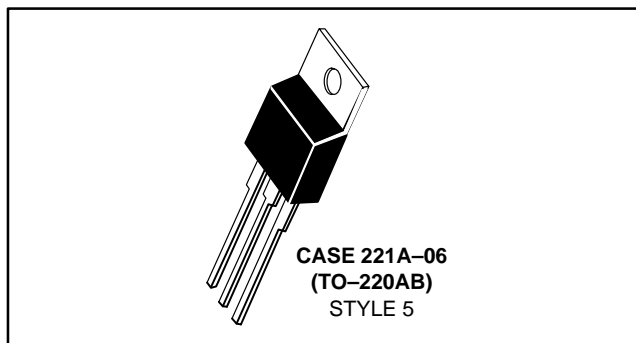
V <sub>(BR)DSS</sub> (Volts) Min	R <sub>DS(on)</sub> (Ohms) Max	@	I <sub>D</sub> (Amps)	Device <sup>(4)</sup>	I <sub>D</sub> (cont) Amps	P <sub>D</sub> <sup>(1)</sup> (Watts) Max
60	0.05		15	<i>MTB30N06VL</i>	30	2.5 <sup>(3)</sup>
	0.032		21	<i>MTB50N06VL</i>	42	
30	0.025		25	<i>MTB50P03HDL</i> <sup>(5)</sup>	50	
	0.0075		37.5	<i>MTB75N03HDL</i>	75	

(1) T<sub>C</sub> = 25°C

(3) Power rating when mounted on an FR-4 glass epoxy printed circuit board with the minimum recommended footprint.

(4) Available in tape and reel — add T4 suffix to part number.

(5) Indicates P-Channel



### TO-220AB — N and P-Channel

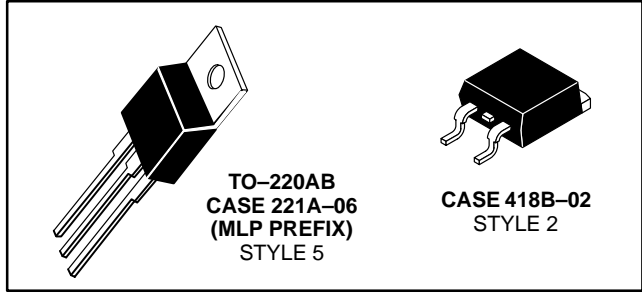
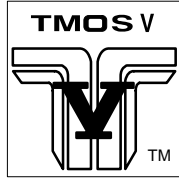
Table 4. TO-220AB — Logic Level

V <sub>(BR)DSS</sub> (Volts) Min	R <sub>DS(on)</sub> (Ohms) Max	@	I <sub>D</sub> (Amps)	Device	I <sub>D</sub> (cont) Amps	P <sub>D</sub> <sup>(1)</sup> (Watts) Max
100	0.22		5	<i>MTP10N10EL</i>	10	75
60	0.18		6	<i>MTP3055EL</i>	12	48
	0.18		6	<i>MTP3055VL</i>	12	
	0.05		15	<i>MTP30N06EL</i>	30	75
	0.05		15	<i>MTP30N06VL</i>	30	90
	0.028		25	<i>MTP50N06EL</i>	50	150
	0.032		21	<i>MTP50N06VL</i>	42	125
	0.028		26	<i>MTP52N06VL</i>	50	135
50	0.12		7.5	<i>MTP15N06VL</i>	15	65
	0.10		7.5	<i>MTP15N05EL</i>	15	
	0.032		25	<i>MTP50N05EL</i>	50	
30	0.025		25	<i>MTP50P03HDL</i> <sup>(2)</sup>	50	150
	0.0075		37.5	<i>MTP75N03HDL</i>	75	

(1) T<sub>C</sub> = 25°C

(2) Indicates P-Channel

Devices listed in bold, italic are Motorola preferred devices.



## N-Channel

### Insulated Gate Bipolar Transistors (IGBTs)

These devices make up a series of “smart” power devices that automatically clamp spikes in automotive ignition systems and guard against ESD. The devices feature a logic level IGBT (Insulated Gate Bipolar Transistor) with integral active collector clamp and ESD gate protection and are designed primarily as ignition coil drivers to withstand high current in a pulsed mode without latching.

Table 1. N-Channel Ignition IGBTs

BV <sub>CES</sub> (Volts) Clamped	V <sub>CE(on)</sub> @ 10 A	Device	P <sub>D</sub> (1) (Watts) Max	Package
140 V	1.8	<b>MGP20N14CL</b>	150	TO-220AB
350 V	1.8	<b>MGP20N35CL</b> <b>MGB20N35CL</b>	150 2.5(3)(4)	TO-220AB D <sup>2</sup> PAK
400 V	1.8	<b>MGP20N40CL</b> <b>MGB20N40CL</b>	150 2.5(3)(4)	TO-220AB D <sup>2</sup> PAK

(1) T<sub>C</sub> = 25°C

(3) Power rating when mounted on an FR-4 glass epoxy printed circuit board with the minimum recommended footprint.

(4) DPAK and D<sup>2</sup>PAK packages available in tape and reel — add T4 suffix to part number.

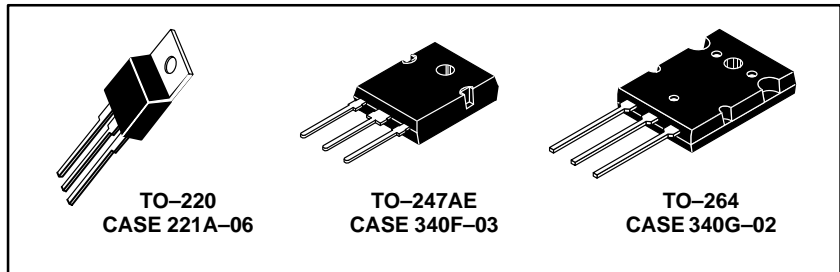


Table 2. N-Channel, Standard and Copackaged IGBTs

Device	BV <sub>CES</sub> (Volts)	I <sub>C</sub> @ 90°C (A)	V <sub>CE(on)</sub> @ I <sub>C</sub> (Volts) Max	P <sub>D</sub> (1) Watts	Package
<b>MGP5N60E</b>	600	5	2.06 A @ 1.5 A	62	TO-220
<b>MGP20N60</b>		20	2.9 V @ 10 A	142	TO-220
<b>MGW20N60D</b>					TO-247
<b>MGW30N60</b>		30	2.9 V @ 15 A	202	TO-247
<b>MGY30N60D</b>					TO-264
<b>MGY40N60</b>		40	2.8 V @ 20 A	260	TO-264
<b>MGY40N60D</b>					TO-264
<b>MGW12N120</b>	1200	12	3.37 V @ 5 A	123	TO-247
<b>MGW12N120D</b>					TO-247
<b>MGY25N120</b>		25	3.24 V @ 12.5 A	212	TO-264

(1) T<sub>C</sub> = 25°C

Devices listed in bold, italic are Motorola preferred devices.