



Power MOSFET

Features

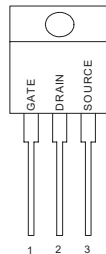
- Robust High Voltage Termination
- Avalanche Energy Specified
- Source-to-Drain Diode Recovery Time Comparable to a Discrete Fast Recovery
- Diode is Characterized for Use in Bridge Circuits
- I_{BSS} Specified at Elevated Temperature

General Description

This high voltage MOSFET uses an advanced termination scheme to provide enhanced voltage-blocking capability without degrading performance over time. In addition, this advanced MOSFET is designed to withstand high energy in avalanche and commutation modes. The new energy efficient design also offers a drain-to-source diode with a fast recovery time. Designed for high voltage, high speed switching applications in power supplies, converters and PWM motor controls, these devices are particularly well suited for bridge circuits where diode speed and commutating safe operating areas are critical and offer additional and safety margin against unexpected voltage transients.

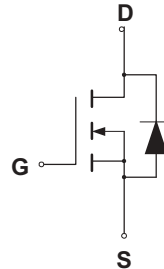
Pin Configuration

TO-220/ITO-220
Front View



Symbol

N-Channel MOSFET





Absolute Maximum Ratings

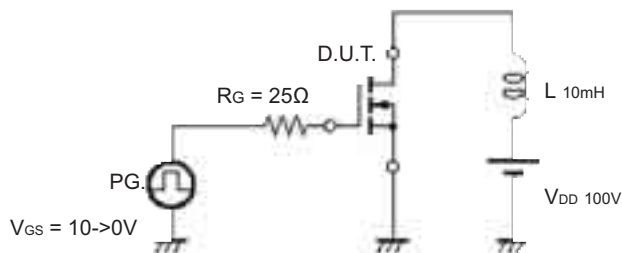
Rating	Symbol	Value	Unit	
Drain Current – Continuous	I_D	6.0	A	
	I_{DM}	18		
Gate-to-Source Voltage – Continuous	V_{GS}	± 20	V	
	V_{GSM}	± 40	V	
Total Power Dissipation	P_D	TO-220	125	W
		ITO-220	45	
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^{\circ}\text{C}$	
Single Pulse Drain-to-Source Avalanche Energy – $T_J = 25^{\circ}\text{C}$ ($V_{DD} = 100\text{V}, V_{GS} = 10\text{V}, I_L = 6\text{A}, L = 10\text{mH}, R_G = 25\Omega$)	E_{AS}	180	mJ	
Thermal Resistance – Junction to Case	θ_{JC}	1.0	$^{\circ}\text{C}/\text{W}$	
	θ_{JA}	62.5		
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	$^{\circ}\text{C}$	

* Pulse Width and frequency is limited by $T_{J(max)}$ and thermal response

Ordering Information

Part Number	Package
CTM06N60N220	TO-220
CTM06N60N220FP	ITO-220

Test Circuit



Test Circuit - Avalanche Capability



Electrical Characteristics

Unless otherwise specified, T_J = 25°C.

		CTM06N60				
Characteristic	Symbol	Min	Typ	Max	Units	
Drain-Source Breakdown Voltage (V _{GS} = 0 V, I _D = 250 μA)	V _{(BR)DSS}	600			V	
Drain-Source Leakage Current (V _{DS} = 600 V, V _{GS} = 0 V) (V _{DS} = 480 V, V _{GS} = 0 V, T _J = 125°C)	I _{DSS}			100 50	μA	
Gate-Source Leakage Current-Forward (V _{gsf} = 20 V, V _{DS} = 0 V)	I _{GSSF}			100	nA	
Gate-Source Leakage Current-Reverse (V _{gsr} = 20 V, V _{DS} = 0 V)	I _{GSSR}			100	nA	
Gate Threshold Voltage (V _{DS} = V _{GS} , I _D = 250 μA)	V _{GS(th)}	2.0		4.0	V	
Static Drain-Source On-Resistance (V _{GS} = 10 V, I _D = 3.0A) *	R _{DS(on)}			1.2	Ω	
Forward Transconductance (V _{DS} = 15 V, I _D = 3.0A) *	g _{FS}	3.4			S	
Input Capacitance	(V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz)	C _{iss}	1498	2100	pF	
Output Capacitance		C _{oss}	158	220	pF	
Reverse Transfer Capacitance		C _{rss}	29	60	pF	
Turn-On Delay Time	(V _{DD} = 300 V, I _D = 6.0 A, V _{GS} = 10 V, R _G = 9.1Ω) *	t _{d(on)}	14	30	ns	
Rise Time		t _r	19	40	ns	
Turn-Off Delay Time		t _{d(off)}	40	80	ns	
Fall Time		t _f	26	55	ns	
Total Gate Charge	(V _{DS} = 300 V, I _D = 6.0 A, V _{GS} = 10 V)*	Q _g	35.5	50	nC	
Gate-Source Charge		Q _{gs}	8.1		nC	
Gate-Drain Charge		Q _{gd}	14.1		nC	
Internal Drain Inductance (Measured from the drain lead 0.25" from package to center of die)	L _D		4.5		nH	
Internal Drain Inductance (Measured from the source lead 0.25" from package to source bond pad)	L _S		7.5		nH	
SOURCE-DRAIN DIODE CHARACTERISTICS						
Forward On-Voltage	(I _S = 6.0 A, d _{IS} /d _t = 100A/μs)	V _{SD}		0.83	1.2	V
Forward Turn-On Time		t _{on}		**		ns
Reverse Recovery Time		t _{rr}		266		ns

* Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%

** Negligible, Dominated by circuit inductance



Typical Electrical Characteristics

Figure 1. On-Region Characteristics

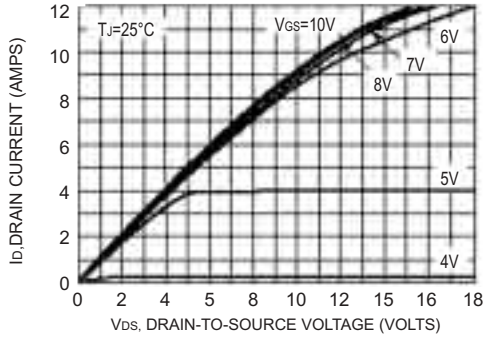


Figure 2. Transfer Characteristics

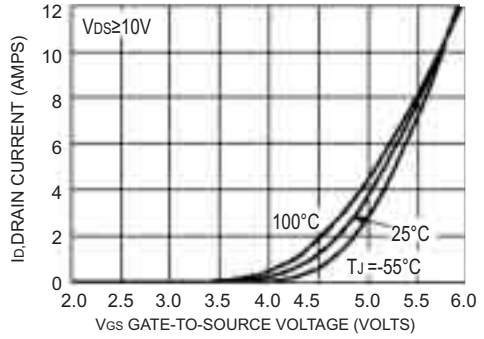


Figure 3. On-Resistance versus Drain Current and Temperature

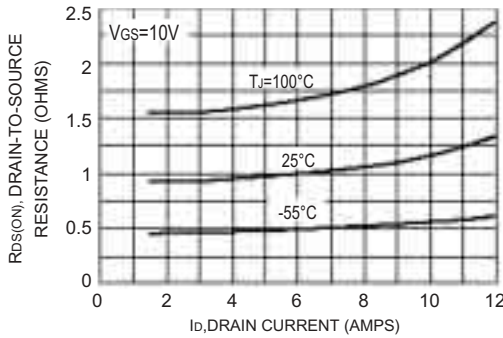


Figure 4. On-Resistance versus Drain Current and Gate Voltage

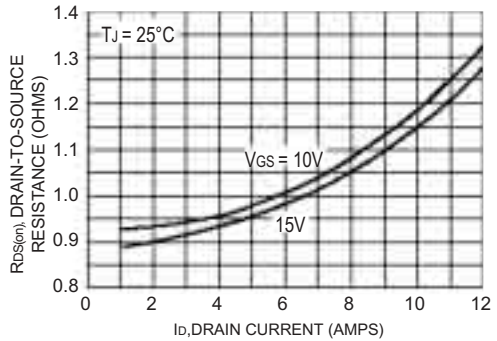


Figure 5. On-Resistance Variation with Temperature

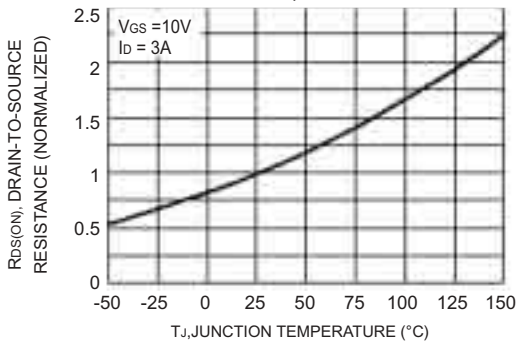
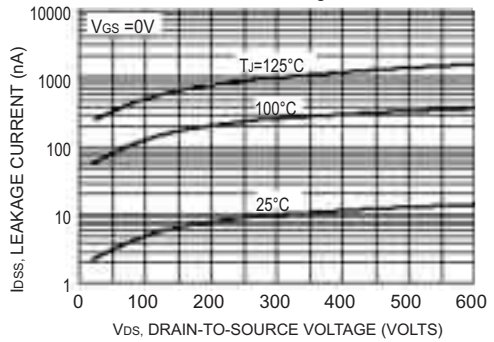


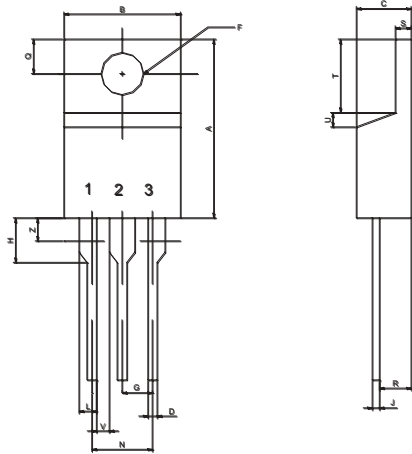
Figure 6. Drain-To-Source Leakage Current versus Voltage





Package Dimension

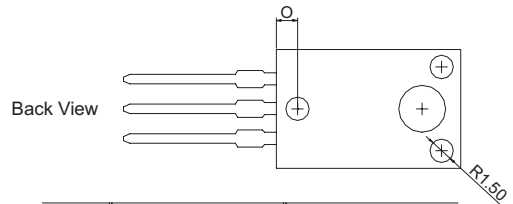
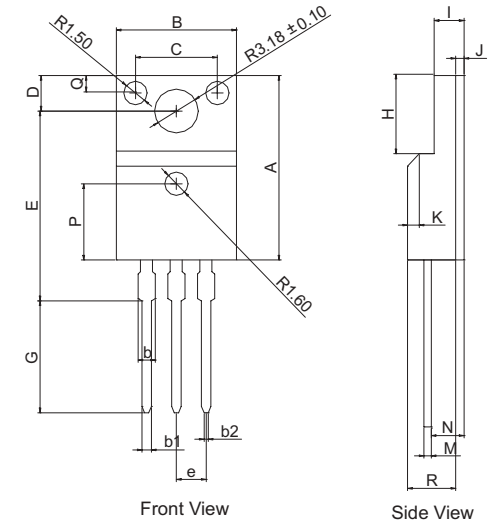
TO-220



PIN 1: GATE
 PIN 2: DRAIN
 PIN 3: SOURCE

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	14.48	----	15.75	0.570	----	0.620
B	9.66	----	10.28	0.380	----	0.405
C	4.07	----	4.82	0.160	----	0.190
D	0.64	----	0.88	0.025	----	0.035
F	3.61	----	3.73	0.142	----	0.147
G	2.42	----	2.66	0.095	----	0.105
H	2.80	----	3.93	0.110	----	0.155
J	0.46	----	0.64	0.018	----	0.025
K	12.70	----	14.27	0.500	----	0.562
L	1.15	----	1.52	0.045	----	0.060
N	4.83	----	5.33	0.190	----	0.210
Q	2.54	----	3.04	0.100	----	0.120
R	2.04	----	2.79	0.080	----	0.110
S	1.15	----	1.39	0.045	----	0.055
T	5.97	----	6.47	0.235	----	0.255
U	0.00	----	1.27	0.000	----	0.050
V	1.15	----	----	0.045	----	----
Z	----	----	2.04	----	----	0.080

ITO-220



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	15.67	----	16.07	0.617	----	0.633
B	9.96	----	10.36	0.392	----	0.408
C	----	7.00	----	----	0.275	----
D	3.20	----	3.40	0.126	----	0.134
E	15.60	----	16.00	0.614	----	0.630
G	9.45	----	10.05	0.372	----	0.396
H	6.48	----	6.88	0.255	----	0.279
I	2.34	----	2.74	0.092	----	0.108
J	----	0.70	----	----	0.028	----
K	----	1.00	----	----	0.039	----
M	0.45	----	0.60	0.018	----	0.024
N	2.56	----	2.96	0.101	----	0.117
O	----	1.80	----	----	0.071	----
P	----	6.50	----	----	0.256	----
Q	----	1.50	----	----	0.059	----
R	4.50	----	4.90	0.177	----	0.193
b	----	----	1.47	----	0.056	----
b1	0.70	----	0.90	0.028	----	0.035
b2	0.25	----	0.45	0.010	----	0.108
e	----	2.54	----	----	0.100	----