

GENERAL DESCRIPTION

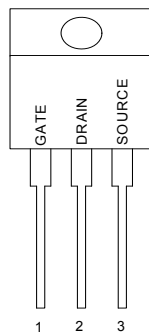
This high voltage MOSFET uses an advanced termination scheme to provide enhanced voltage-blocking capability without degrading performance over time. In addition, this advanced MOSFET is designed to withstand high energy in avalanche and commutation modes. The new energy efficient design also offers 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.

FEATURES

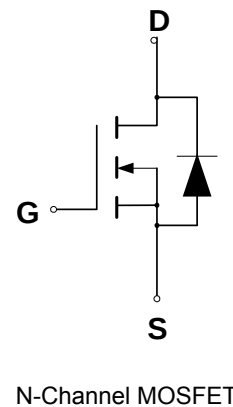
- ◆ Robust High Voltage Termination
- ◆ Avalanche Energy Specified
- ◆ Source-to-Drain Diode Recovery Time Comparable to a Discrete Fast Recovery Diode
- ◆ Diode is Characterized for Use in Bridge Circuits
- ◆ I_{DSS} and $V_{DS(on)}$ Specified at Elevated Temperature

PIN CONFIGURATION

TO-220FP
Top View



SYMBOL



ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain to Current — Continuous	I_D	14	A
— Pulsed	I_{DM}	56	A
Gate-to-Source Voltage — Continue	V_{GS}	± 30	V
— Non-repetitive	V_{GSM}	± 40	V
Total Power Dissipation	P_D	35	W
Derate above 25°C		0.28	W/°C
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C
Single Pulse Drain-to-Source Avalanche Energy — $T_J = 25^\circ\text{C}$ ($V_{DD} = 100\text{V}$, $V_{GS} = 10\text{V}$, $I_L = 14\text{A}$, $L = 6\text{mH}$, $R_G = 25\Omega$)	E_{AS}	588	mJ
Thermal Resistance — Junction to Case	θ_{JC}	3.6	°C/W
— Junction to Ambient	θ_{JA}	62.5	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	°C

ORDERING INFORMATION

Part Number	Package
CMT14N50GN220FP*	TO-220 Full Package

*Note: G : Suffix for PB Free Product

ELECTRICAL CHARACTERISTICS

Unless otherwise specified, $T_J = 25^\circ\text{C}$.

		CMT14N50				
Characteristic		Symbol	Min	Typ	Max	Units
Drain-Source Breakdown Voltage (V _{GS} = 0 V, I _D = 250 μA)		V _{(BR)DSS}	500			V
Drain-Source Leakage Current (V _{DS} = 500 V, V _{GS} = 0 V) (V _{DS} = 400 V, V _{GS} = 0 V, T _J = 125°C)		I _{DSS}			1 3	μA
Gate-Source Leakage Current-Forward (V _{gsf} = 30 V, V _{DS} = 0 V)		I _{GSSF}			100	nA
Gate-Source Leakage Current-Reverse (V _{gsr} = -30 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 = 7A) *		R _{DS(on)}			0.34	Ω
Drain-Source On-Voltage (V _{GS} = 10 V) (I _D = 7 A)		V _{DS(on)}			7.5	V
Forward Transconductance (V _{DS} = 50 V, I _D = 8.4A) *		g _{FS}	9.3			mhos
Input Capacitance	(V _{DS} = 25 V, V _{GS} = 0 V, f = 1.0 MHz)	C _{iss}		2038		pF
Output Capacitance		C _{oss}		307		pF
Reverse Transfer Capacitance		C _{rss}		10		pF
Turn-On Delay Time	(V _{DD} = 250 V, I _D = 7 A, R _D = 17Ω, R _G = 6.2Ω) *	t _{d(on)}		15		ns
Rise Time		t _r		36		ns
Turn-Off Delay Time		t _{d(off)}		35		ns
Fall Time		t _f		29		ns
Total Gate Charge	(V _{DS} = 400 V, I _D = 7 A, V _{GS} = 10 V)*	Q _g			64	nC
Gate-Source Charge		Q _{gs}			16	nC
Gate-Drain Charge		Q _{gd}			26	nC
Internal Drain Inductance (Measured from the drain lead 0.25" from package to center of die)		L _D		5.0		nH
Internal Drain Inductance (Measured from the source lead 0.25" from package to source bond pad)		L _S		13		nH
SOURCE-DRAIN DIODE CHARACTERISTICS						
Forward On-Voltage(1)	(I _S =7 A, V _{GS} = 0 V, d _{IS} /d _t = 100A/μs)	V _{SD}			1.5	V
Forward Turn-On Time		t _{on}		**		ns
Reverse Recovery Time		t _{rr}		487	731	ns

* Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$

** Negligible, Dominated by circuit inductance

TYPICAL ELECTRICAL CHARACTERISTICS

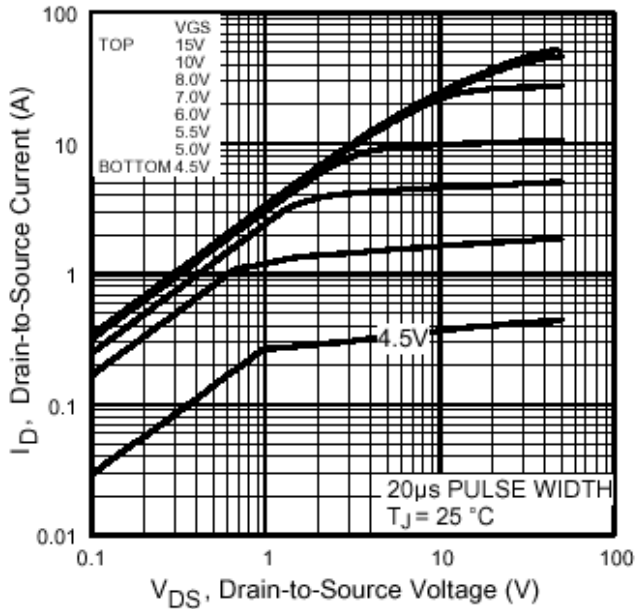


Fig 1. Typical Output Characteristics

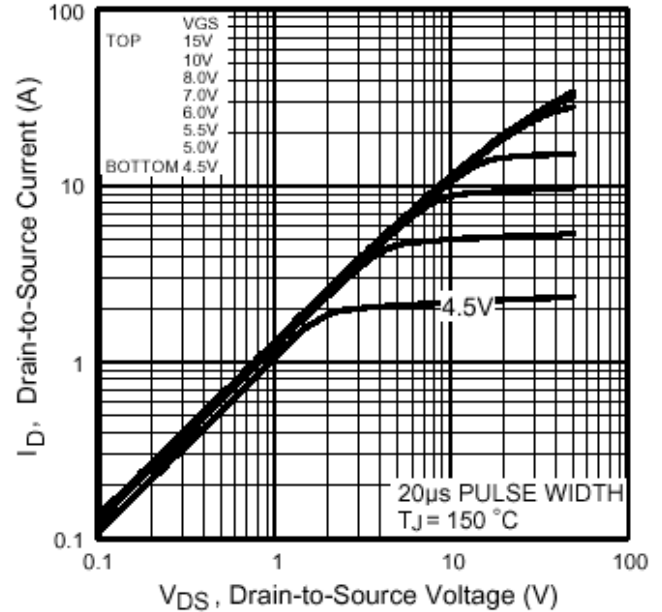


Fig 2. Typical Output Characteristics

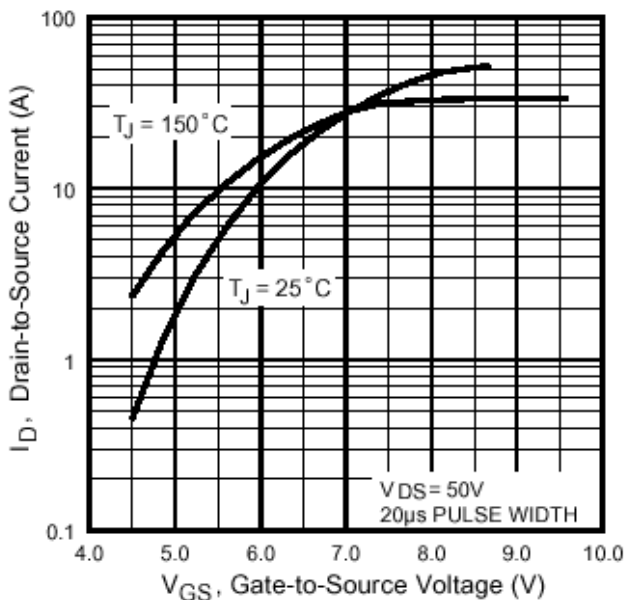


Fig 3. Typical Transfer Characteristics

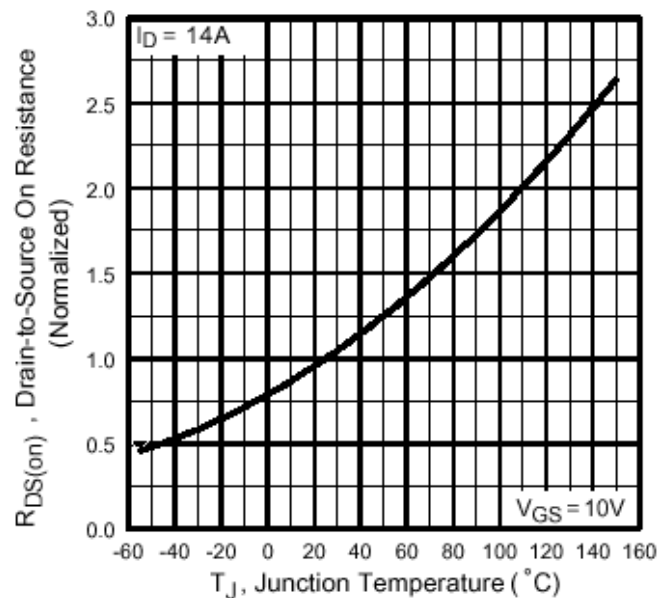


Fig 4. Normalized On-Resistance Vs. Temperature

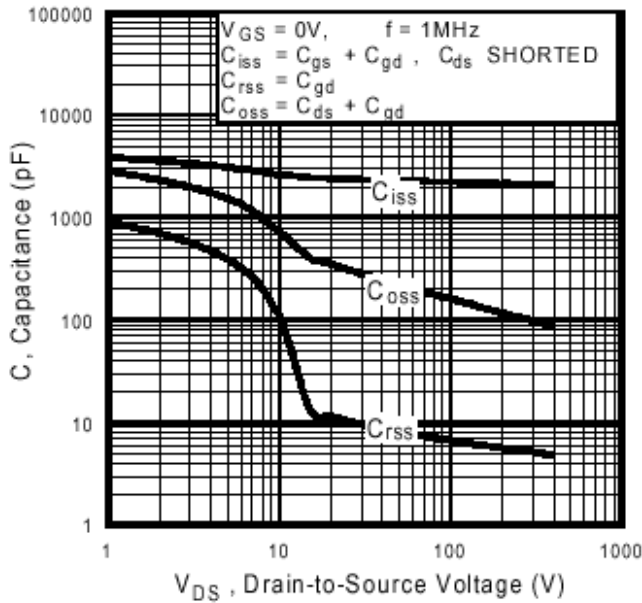


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

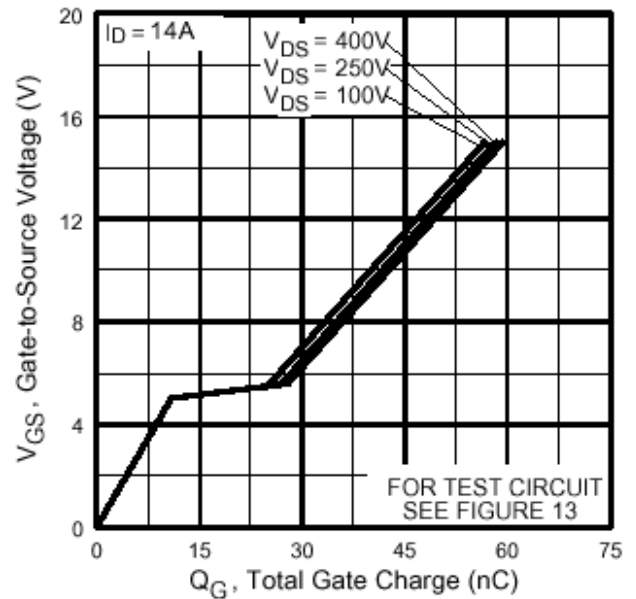


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

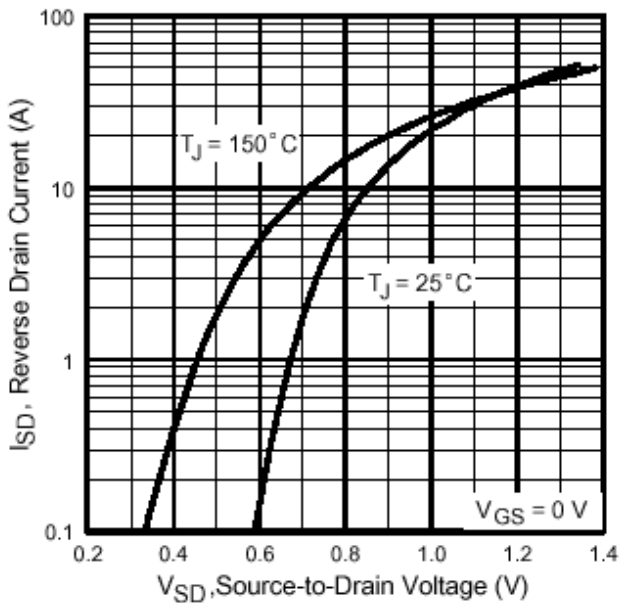


Fig 7. Typical Source-Drain Diode Forward Voltage

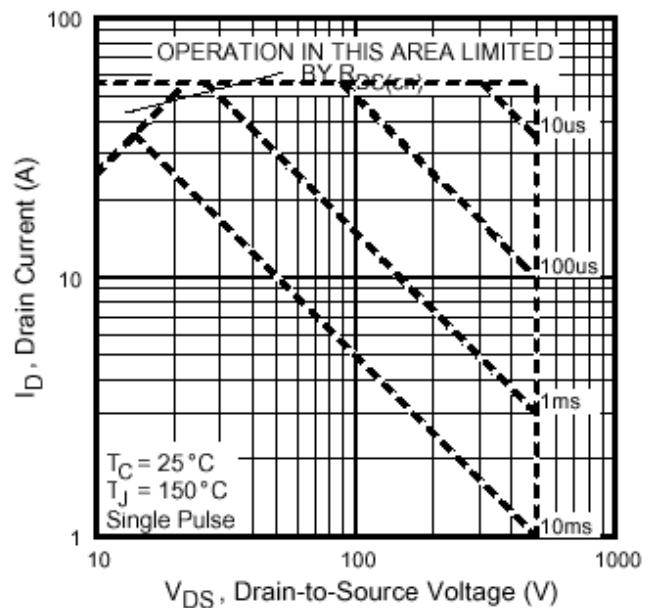


Fig 8. Maximum Safe Operating Area

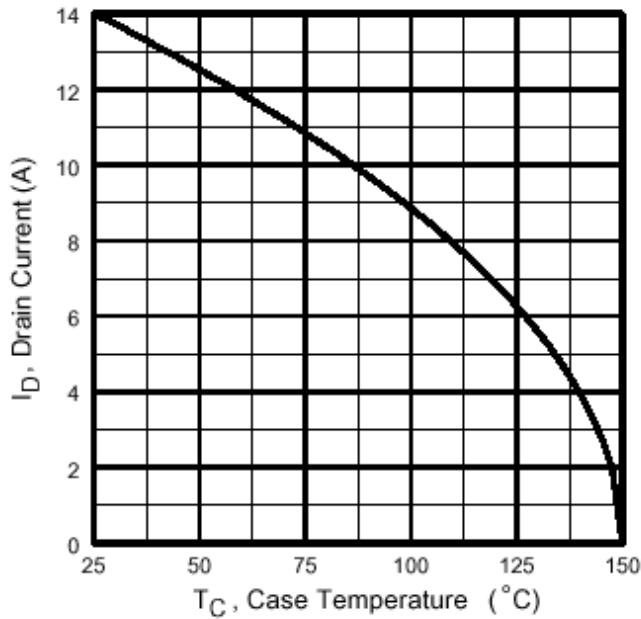


Fig 9. Maximum Drain Current Vs. Case Temperature

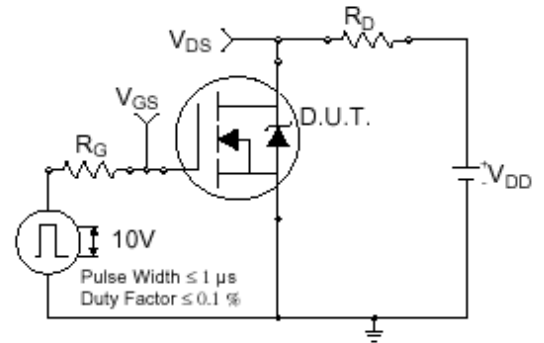


Fig 10a. Switching Time Test Circuit

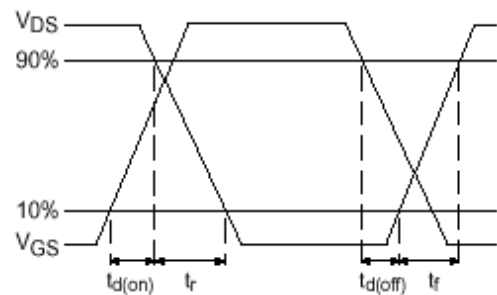


Fig 10b. Switching Time Waveforms

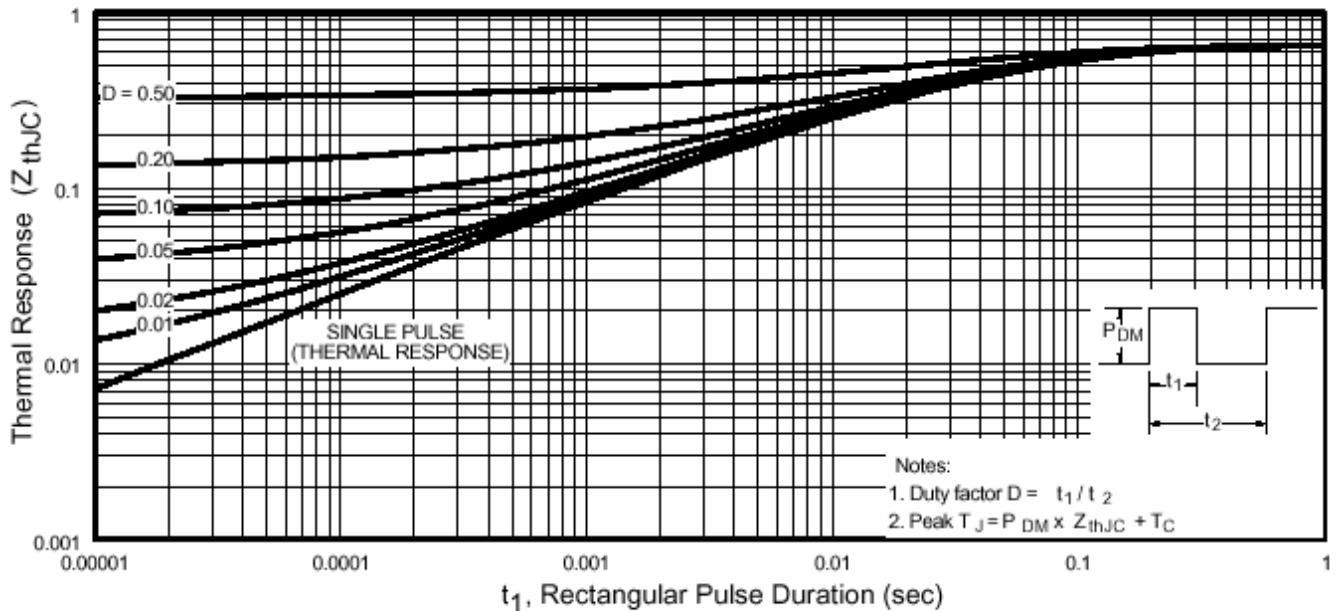


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

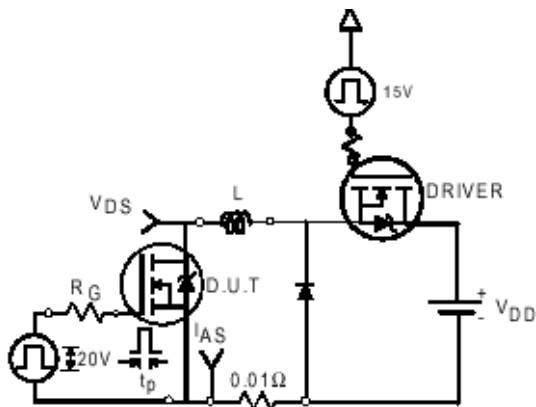


Fig 12a. Unclamped Inductive Test Circuit

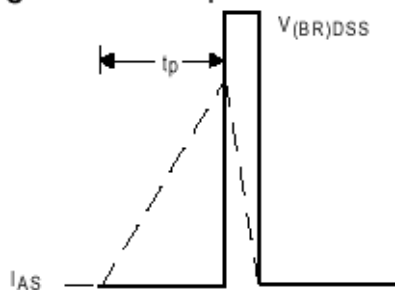


Fig 12b. Unclamped Inductive Waveforms

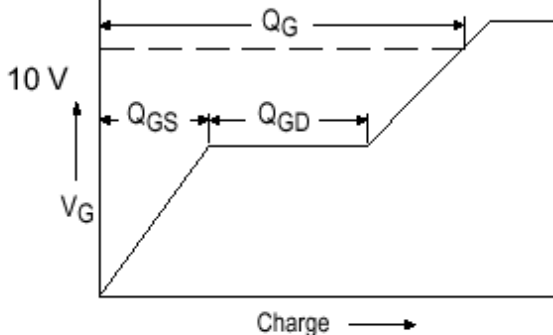


Fig 13a. Basic Gate Charge Waveform

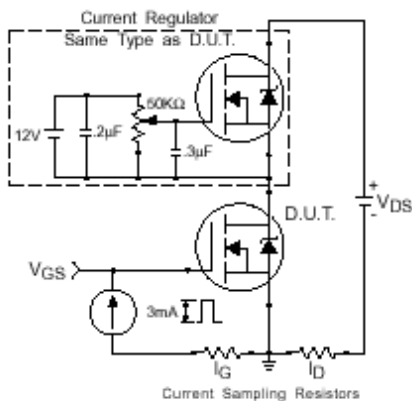


Fig 13b. Gate Charge Test Circuit

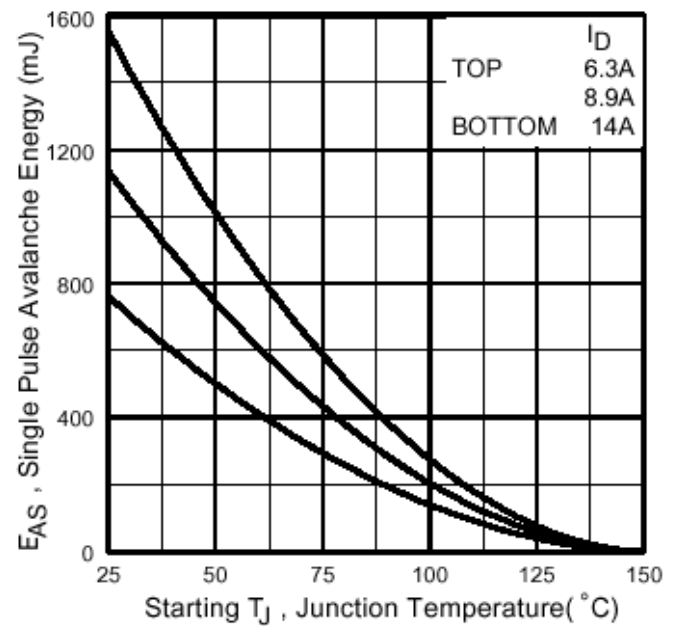


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

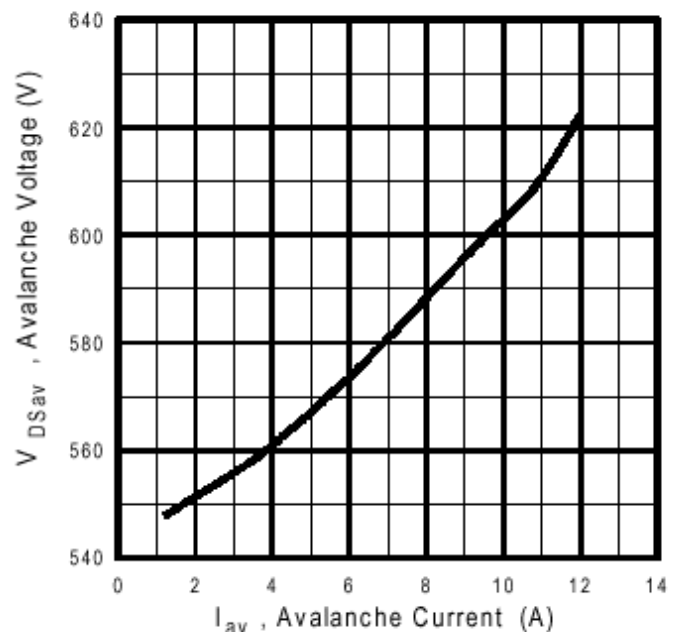
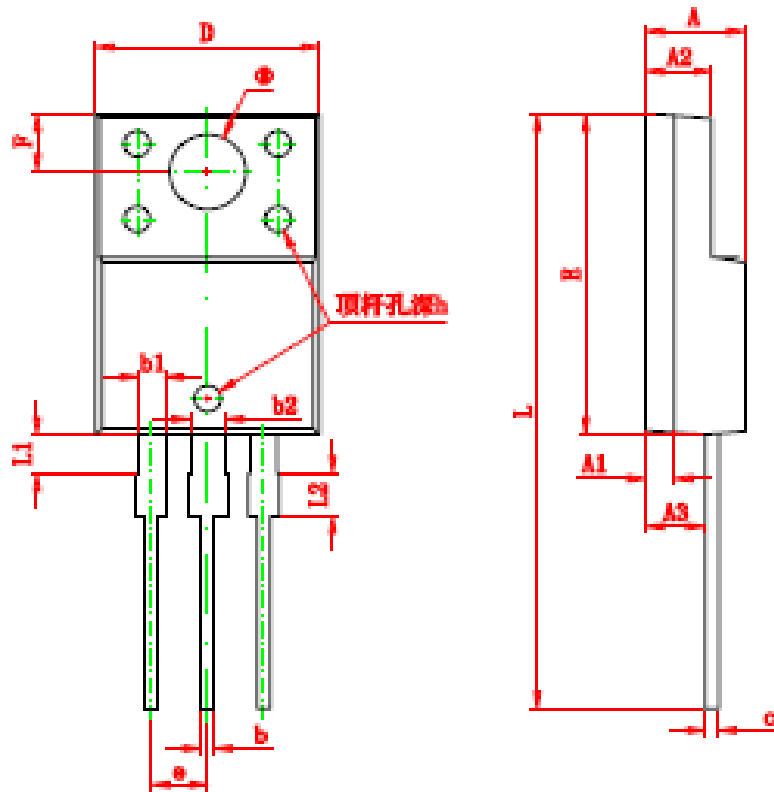


Fig 12d. Typical Drain-to-Source Voltage Vs. Avalanche Current

PACKAGE DIMENSION

TO-220FP



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	4.300	4.700	0.169	0.185
A1	1.300 REF		0.051 REF	
A2	2.800	3.200	0.110	0.126
A3	2.500	2.900	0.098	0.114
b	0.500	0.750	0.020	0.030
b1	1.100	1.350	0.043	0.053
b2	1.500	1.750	0.059	0.069
c	0.500	0.750	0.020	0.030
D	9.960	10.360	0.392	0.408
E	14.800	15.200	0.583	0.598
e	2.540 TYP		0.100 TYP	
F	2.700 REF		0.106 REF	
Φ	3.500 REF		0.138 REF	
h	0.000	0.300	0.000	0.012
L	28.000	28.400	1.102	1.118
L1	1.700	1.900	0.067	0.075
L2	1.900	2.100	0.075	0.083

IMPORTANT NOTICE

Champion Microelectronic Corporation (CMC) reserves the right to make changes to its products or to discontinue any integrated circuit product or service without notice, and advises its customers to obtain the latest version of relevant information to verify, before placing orders, that the information being relied on is current.

A few applications using integrated circuit products may involve potential risks of death, personal injury, or severe property or environmental damage. CMC integrated circuit products are not designed, intended, authorized, or warranted to be suitable for use in life-support applications, devices or systems or other critical applications. Use of CMC products in such applications is understood to be fully at the risk of the customer. In order to minimize risks associated with the customer's applications, the customer should provide adequate design and operating safeguards.

HsinChu Headquarter

5F-1, No. 11, Park Avenue II,
Science-Based Industrial Park,
HsinChu City, Taiwan
TEL: +886-3-567 9979
FAX: +886-3-567 9909

Sales & Marketing

21F., No. 96, Sec. 1, Sintai 5th Rd., Sijhih City,
Taipei County 22102,
Taiwan, R.O.C.
TEL: +886-2-2696 3558
FAX: +886-2-2696 3559
