CMT09N20
POWER MOSFET

GENERAL DESCRIPTION

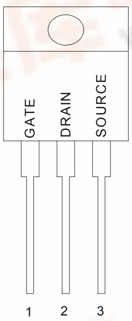
This Power MOSFET is designed for low voltage, high speed power switching applications such as switching regulators, converters, solenoid and relay drivers.

FEATURES

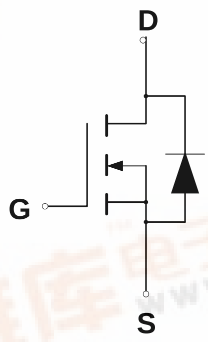
- Dynamic dv/dt Rating
- Repetitive Avalanche Rated
- Fast Switching
- Ease of Paralleling
- Simple Drive Requirements

PIN CONFIGURATION

TO-220
Top View



SYMBOL



N-Channel MOSFET

ORDERING INFORMATION

Part Number	Package
CMT09N20N220	TO-220

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain to Current — Continuous	I_D	9.0	A
— Pulsed (Note 1)	I_{DM}	36	
Gate-to-Source Voltage — Continue	V_{GS}	±20	V
Total Power Dissipation	P_D	74	W
Derate above 25℃		0.59	W/℃
Single Pulse Avalanche Energy (Note 2)	E_{AS}	56	mJ
Avalanche Current (Note 1)	I_{AR}	9.0	A
Repetitive Avalanche Energy (Note 1)	E_{AR}	7.4	mJ
Peak Diode Recovery dv/dt	dv/dt	5.0	V/ns
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 150	℃
Thermal Resistance — Junction to Case	θ_{JC}	1.70	℃/W
— Junction to Ambient	θ_{JA}	62	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	300	℃

ELECTRICAL CHARACTERISTICS

Unless otherwise specified, T_J = 25℃.

Characteristic	Test Conditions	Symbol	CMT09N20 Min	CMT09N20 Typ	CMT09N20 Max	Units
Drain-Source Breakdown Voltage	(V_{GS} = 0 V, I_D = 250 μA)	$V_{(BR)DSS}$	200			V
Drain-Source Leakage Current	(V_{DS} = 200V, V_{GS} = 0 V)	I_{DSS}			25	μA
	(V_{DS} = 160V, V_{GS} = 0 V, T_J = 125℃)				250	
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 = 5.4A) (Note 4)	$R_{DS(on)}$			0.40	Ω
Forward Transconductance	(V_{DS} = 50V, I_D = 5.4 A) (Note 4)	g_{FS}	3.8			mhos
Input Capacitance	(V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz)	C_{iss}		800		pF
Output Capacitance		C_{oss}		240		pF
Reverse Transfer Capacitance		C_{rss}		76		pF
Turn-On Delay Time	(V_{DD} = 100 V, I_D = 5.9 A, R_G = 12Ω, R_D = 16Ω) (Note 4)	$t_{d(on)}$		9.4		ns
Rise Time		t_r		28		ns
Turn-Off Delay Time		$t_{d(off)}$		39		ns
Fall Time		t_f		20		ns
Total Gate Charge	(V_{DS} = 160V, I_D = 5.9A V_{GS} = 10 V) (Note 4)	Q_g			43	nC
Gate-Source Charge		Q_{gs}			7.0	nC
Gate-Drain Charge		Q_{gd}			23	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						
Reverse Recovery Charge	I_F = 5.9A, di/dt = 100A/μs , T_J = 25℃ (Note 4)	Q_{rr}		1.1	2.2	μC
Forward Turn-On Time		t_{on}		**		
Reverse Recovery Time		t_{rr}		170	340	ns
Diode Forward Voltage	I_S = 9.0A, V_{GS} = 0 V, T_J = 25℃ (Note 4)	V_{SD}			1.5	V

Note

(1) Repetitive rating; pulse width limited by max. junction temperature

(2) V_{DD} = 100V, V_{GS} = 10V , starting T_J = 25℃, L=1.38mH, R_G = 25Ω, I_{AS} = 9.0A

(3) I_{SD} ≦ 9.0A, di/dt ≦ 120A/μs, V_{DD} ≦ $V_{(BR)DSS}$, T_J ≦ 150℃

(4) Pulse Test: Pulse Width ≦300μs, Duty Cycle ≦2%

** Negligible, Dominated by circuit inductance

TYPICAL ELECTRICAL CHARACTERISTICS

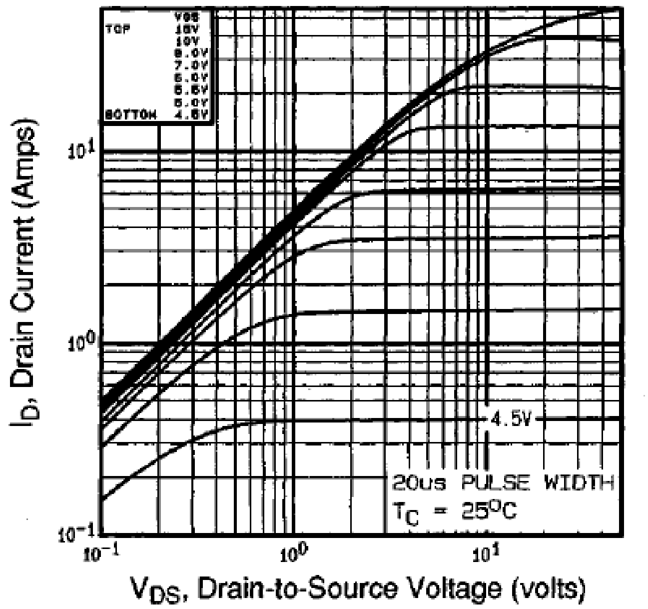


Fig 1. Typical Output Characteristics, T_C=25°C

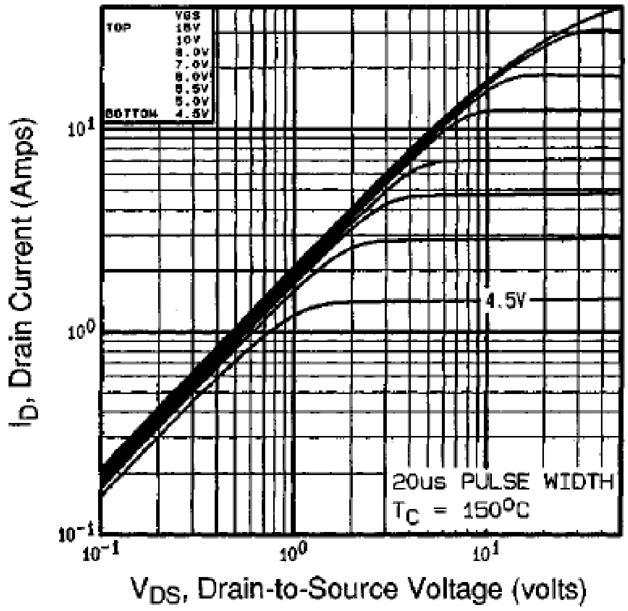


Fig 2. Typical Output Characteristics, T_C=150°C

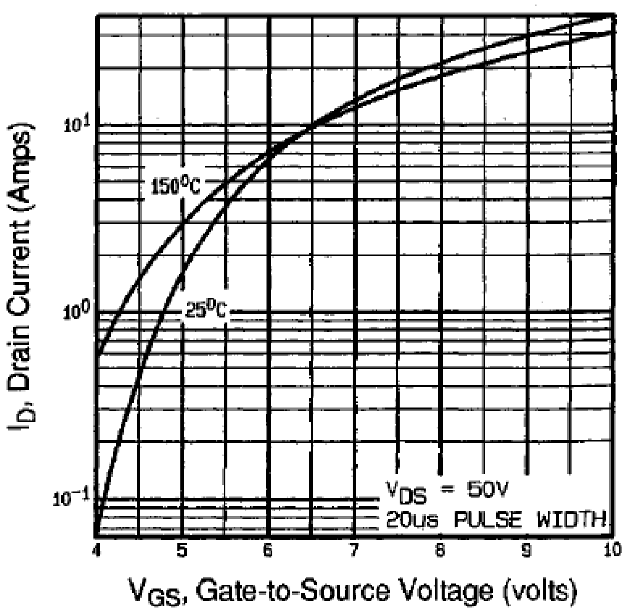


Fig 3. Typical Transfer Characteristics

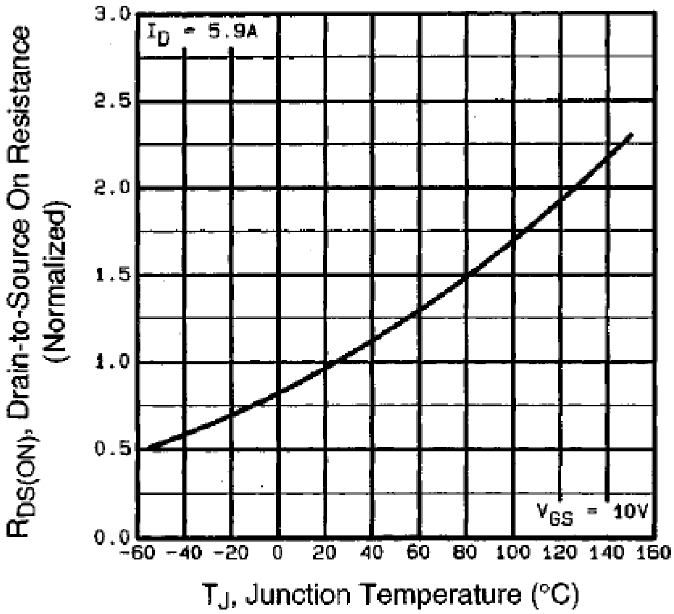


Fig 4. Normalized On-Resistance Vs. Temperature

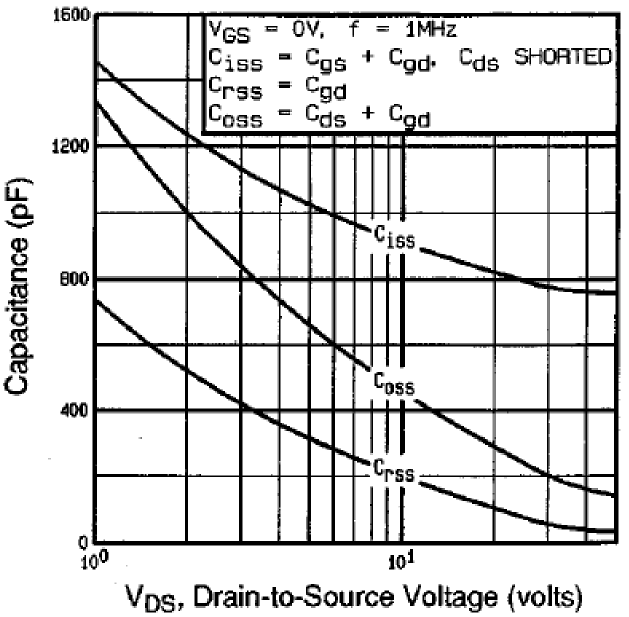


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

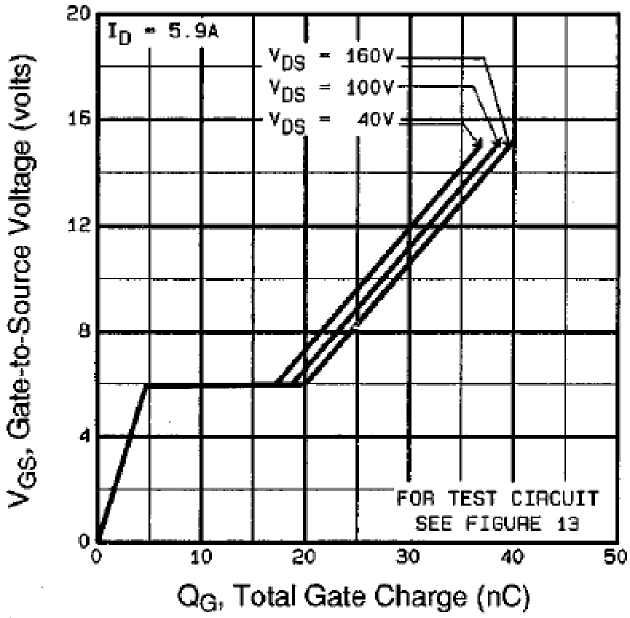


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

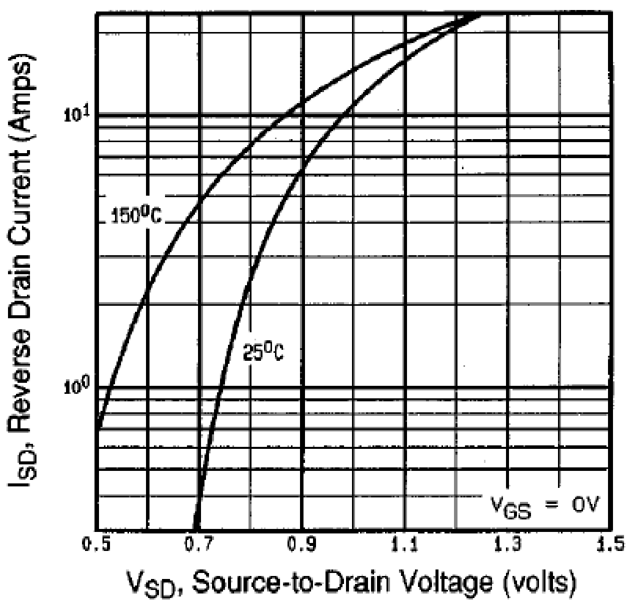


Fig 7. Typical Source-Drain Diode Forward Voltage

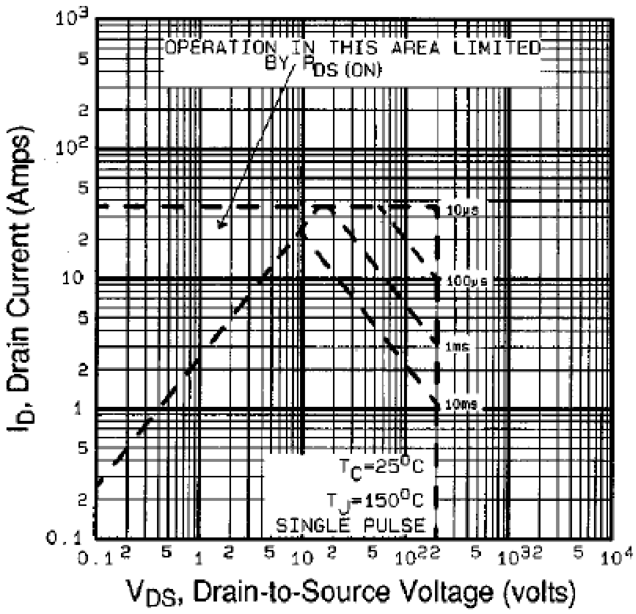


Fig 8. Maximum Safe Operating Area

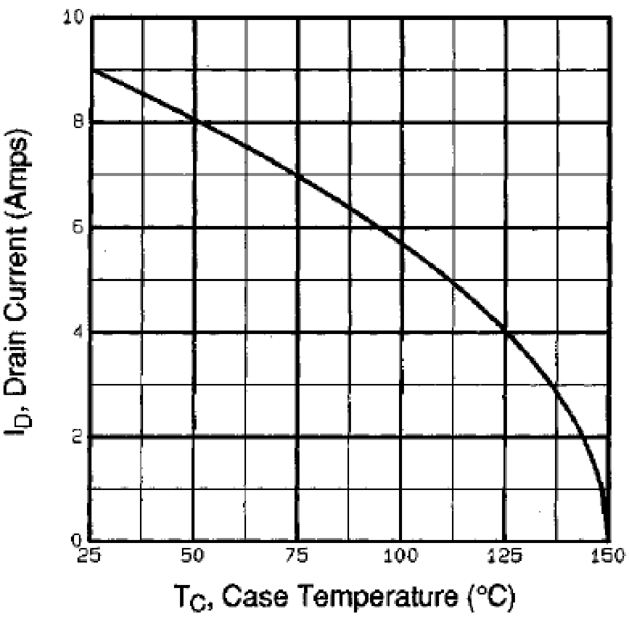


Fig 9. Maximum Drain Current Vs. Case Temperature

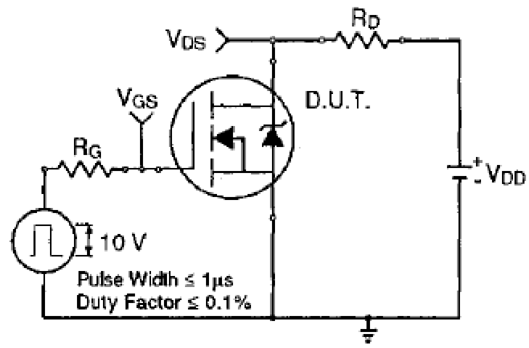


Fig 10a. Switching Time Test Circuit

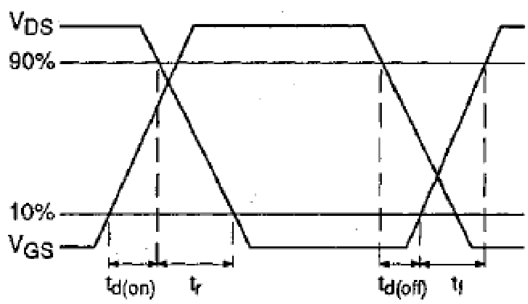


Fig 10b. Switching Time Waveforms

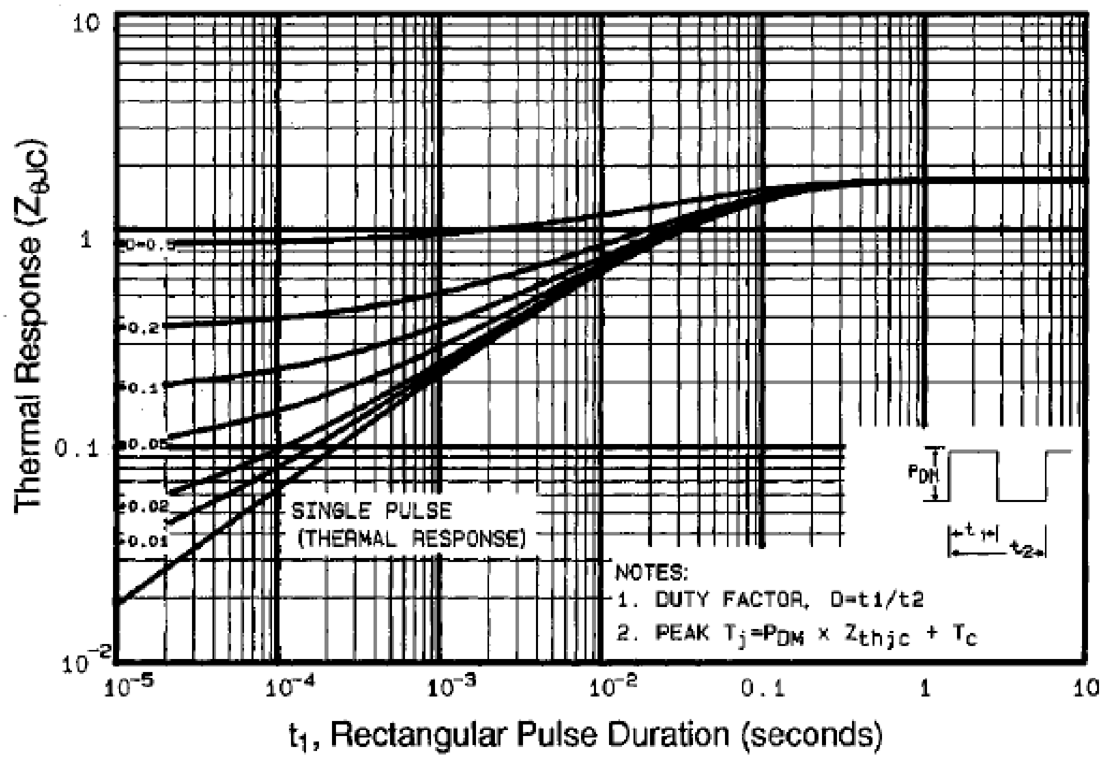


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

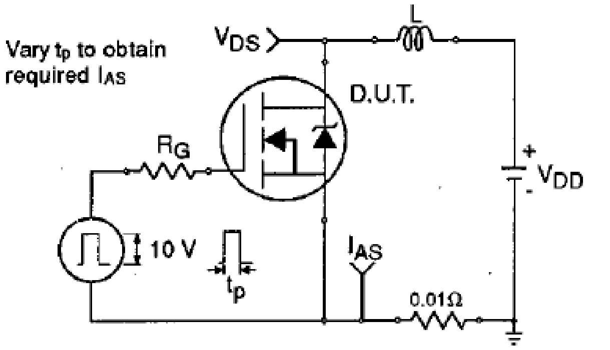


Fig 12a. Unclamped Inductive Test Circuit

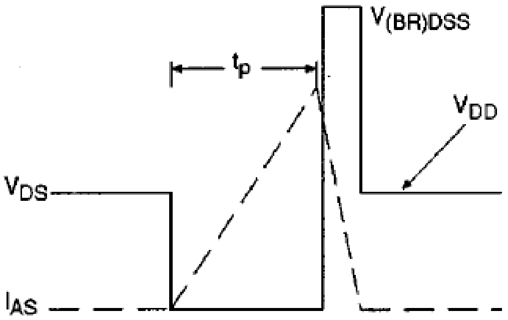


Fig 12b. Unclamped Inductive Waveforms

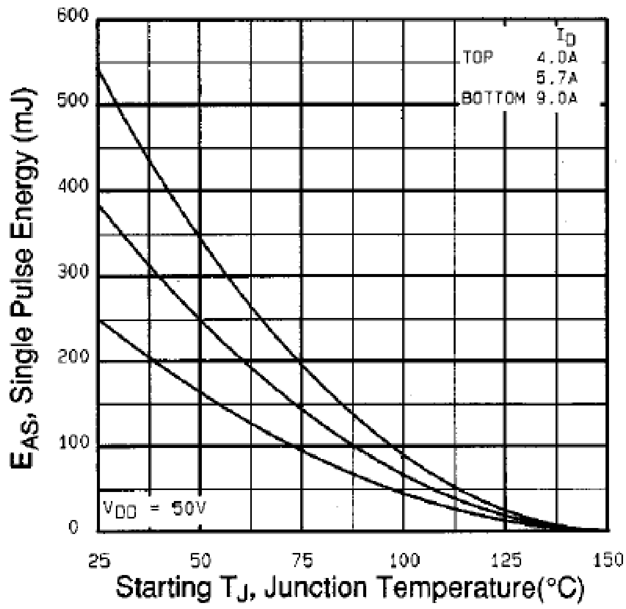


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

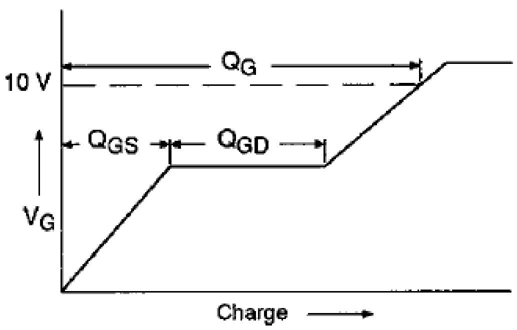


Fig 13a. Basic Gate Charge Waveform

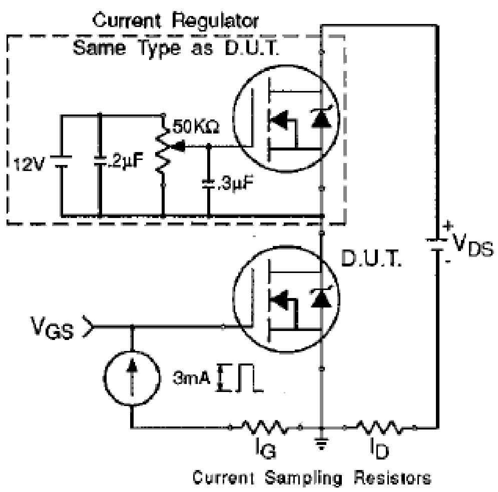
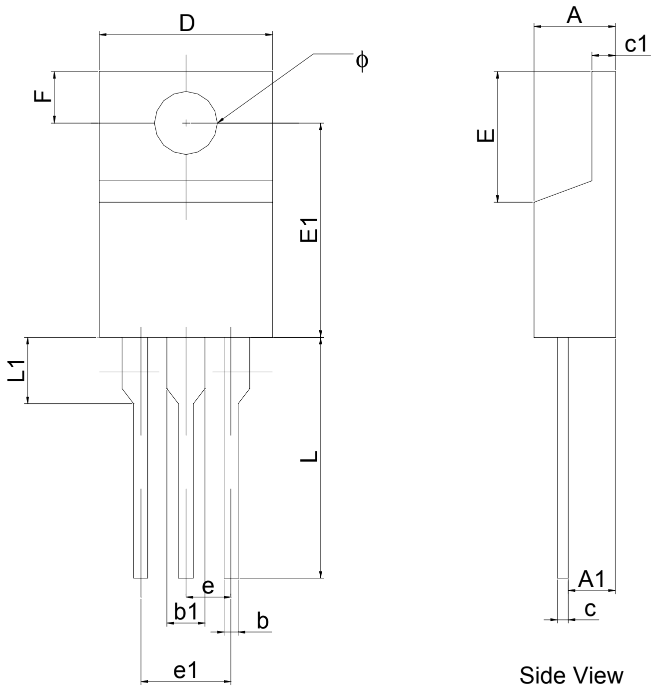


Fig 13b. Gate Charge Test Circuit

PACKAGE DIMENSION

TO-220



Front View

Side View

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

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHS		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.47	---	4.67	0.176	---	0.184
A1	2.52	---	2.82	0.099	---	0.111
b	0.71	---	0.91	0.028	---	0.036
b1	1.17	---	1.37	0.046	---	0.054
c	0.31	---	0.53	0.012	---	0.021
c1	1.17	---	1.37	0.046	---	0.054
D	10.01	---	10.31	0.394	---	0.406
E	8.50	---	8.90	0.335	---	0.350
E1	12.06	---	12.46	0.475	---	0.491
e	---	2.54	---	---	0.100	---
e1	4.98	---	5.18	0.196	---	0.204
F	2.59	---	2.89	0.102	---	0.114
L	13.40	---	13.80	0.528	---	0.543
L1	3.56	---	3.96	0.140	---	0.156
ϕ	3.79	---	3.89	0.149	---	0.153

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	Sales & Marketing
5F, No. 11, Park Avenue II,	11F, No. 306-3, SEC. 1, Ta Tung Road,
Science-Based Industrial Park,	Hsichih, Taipei Hsien 221, Taiwan
HsinChu City, Taiwan	
TEL: +886-3-567 9979	TEL: +886-2-8692 1591
FAX: +886-3-567 9909	FAX: +886-2-8692 1596