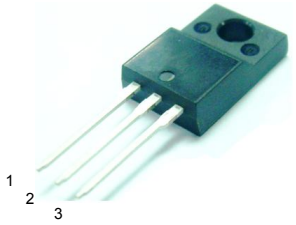
TAK CHEONG®

SEMICONDUCTOR

TFF10N60

N-Channel Power MOSFET

10A, 600V, 0.75Ω



1 = Gate
2 = Drain
3 = Source

TO-220FP

DEVICE MARKING DIAGRAM

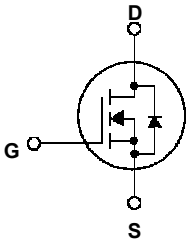
L = Tak Cheong Logo
xxyy = Monthly Date Code
TFFXXXX = Device Type

GENERAL DESCRIPTION

The N-Channel MOSFET is used an advanced termination scheme to provide enhanced voltage-blocking capability without degrading performance over time. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance. This device is well suited for high efficiency switched mode power suppliers, active power factor correction, electronic lamp ballasts based half bridge topology.

FEATURES

- Robust high voltage termination
- Avalanche energy specified
- Diode is characterized for use in bridge circuits
- Source to Drain diode recovery time comparable to a discrete fast recovery diode.



ABSOLUTE MAXIMUM RATINGS (T_C=25°C, unless otherwise noted)

Symbol	Parameter		Value	Units
V_{DSS}	Drain- Source Voltage		600	V
V_{GSS}	Gate-Source Voltage		±20	V
I_D	Drain Current		10	A
	Continuous Drain Current Tc=100℃		6.4	A
I_{DM}	Drain Current Pulsed		40	A
P_D	Power Dissipation	(Note 2)	45	W
	Derating Factor above 25℃		0.36	W/℃
E_{AS}	Single Pulsed Avalanche Energy	(Note 1)	300	mJ
E_{AR}	Repetitive Avalanche Energy	(Note 2)	30	mJ
T_J	Operating Junction Temperature		150	℃
T_{stg}	Storage Temperature Range		- 55 to +150	℃

Notes:

1. L=10mH, I_{AS}=8.0A, V_{DD}=50V, R_G=50Ω, Starting T_J=25℃
2. Repetitive Rating: Pulse width limited by maximum junction temperature.

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	2.78	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62	℃/W

ELECTRICAL CHARACTERISTICS

Off Characteristics (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Sounce Breakdown Voltage	V_{GS} = 0V, I_D = 250uA	600	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 600V, V_{GS} = 0V	--	--	25	uA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 20V, V_{DS} = 0V	--	--	10	uA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -20V, V_{DS} = 0V	--	--	-10	uA

On Characteristics (T_A = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS\ (th)}$	Gate Threshold Voltage	V_{DS} = V_{GS} , I_D = 250uA	2.0	--	4.0	V
$R_{DS(ON)}$	On-Resistance	V_{GS} = 10V, I_D = 5A	--	0.63	0.75	Ω

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Ciss	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	--	1430	--	pF
Coss	Output Capacitance		--	160	---	pF
Crss	Reverse Transfer Capacitance		--	28	--	pF

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Tum-On Delay Time	V_{DD} = 300V, I_D = 10A, V_{GS} = 10V, R_G = 4.7 Ω (Note 3 & 4)	--	20	--	nS
tr	Tum-On Rise Time		--	20	--	nS
$t_{d(off)}$	Tum-Off Delay Time		--	55	--	nS
tr	Tum-Off Fall Time		--	30	--	nS
Qg	Total Gate Charge	V_{DS} = 480V, I_D = 10A, V_{GS} = 10V (Note 3 & 4)	--	60	70	nC
Qgs	Gate-Source Charge		--	12	--	nC
Qgd	Gate-Drain Charge		--	28	--	nC

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Test Conditions	Min.	Typ,	Max.	Unit
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	10	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	40	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0V, I_S = 10A	--	--	1.5	V
Trr	Reverse Recovery Time	V_{GS} = 0V, I_S = 10A, dI_F / dt = 100A/uS (Note 3)	--	600	--	nS
Qrr	Reverse Recovery Charge		--	4.3	--	nC
I_{RRM}	Reverse Recovery Current		--	13	--	A

Notes:
3. Pulse Test: Pulse width < 380us, Duty cycle ≤ 2%.
4. Basically not affected by working temperature.

TYPICAL CHARACTERISTICS

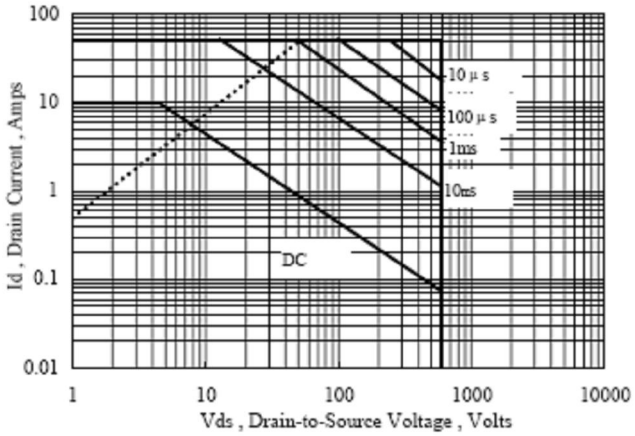


Figure 1 Maximun Forward Bias Safe Operating Area

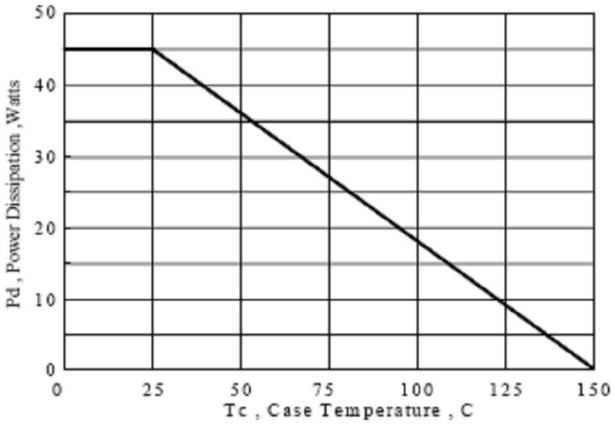


Figure 2 Maximun Power Dissipation vs Case Temperature

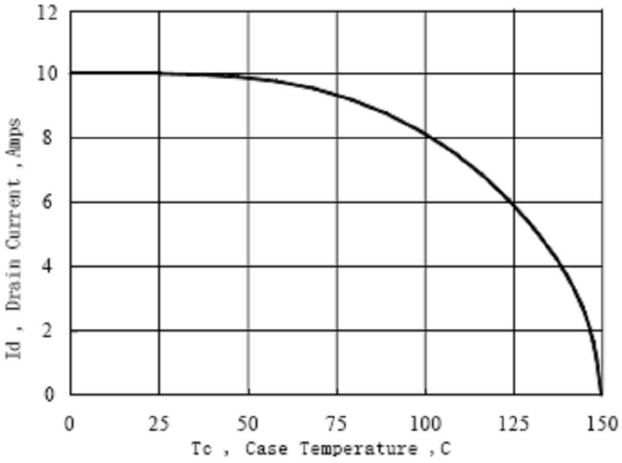


Figure 3 Maximum Continuous Drain Current vs Case Temperature

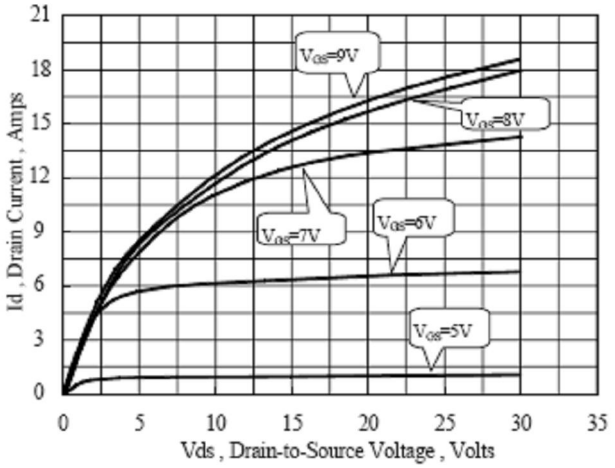


Figure 4 Typical Output Characteristics

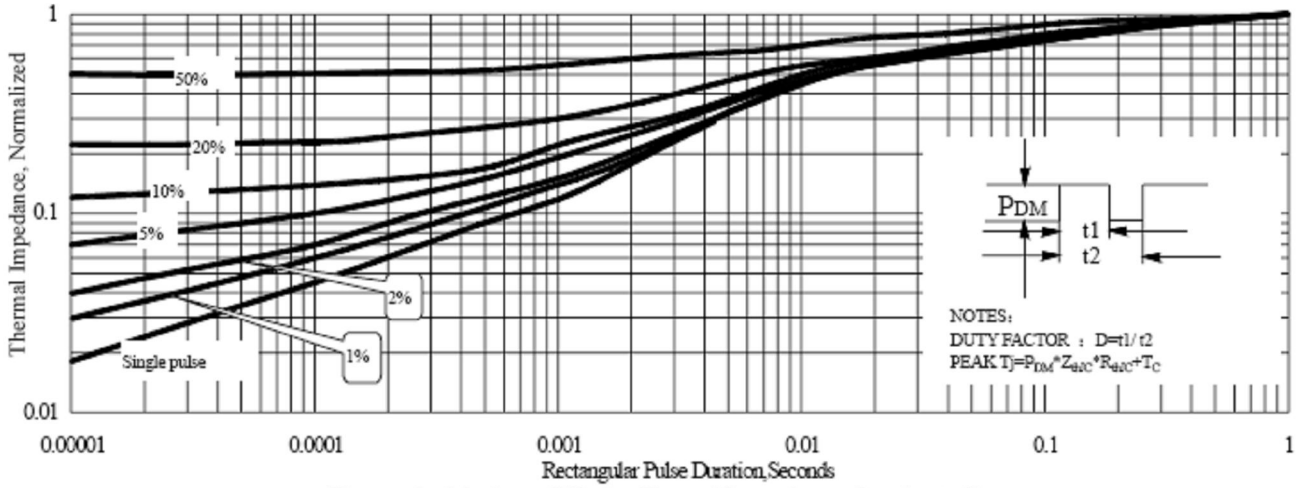


Figure 5 Maximum Effective Thermal Impendance , Junction to Case

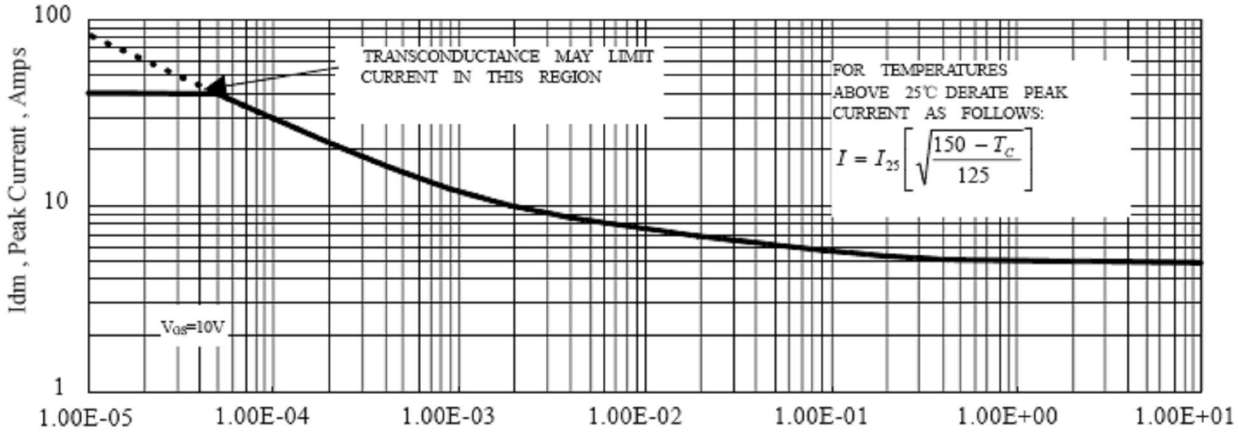


Figure 6 Maximun Peak Current Capability

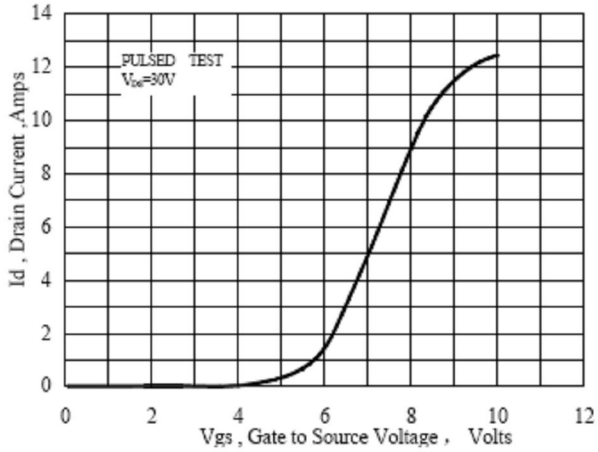


Figure 7 Typical Transfer Characteristics

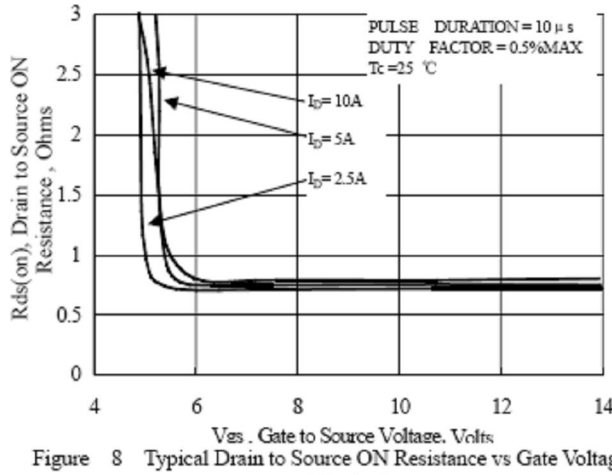


Figure 8 Typical Drain to Source ON Resistance vs Gate Voltage and Drain Current

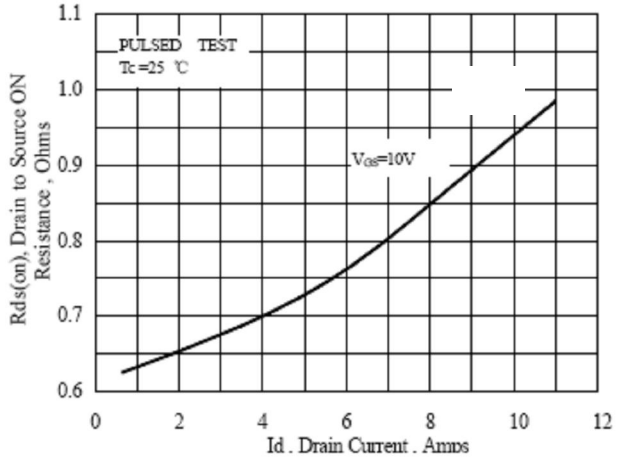


Figure 9 Typical Drain to Source ON Resistance vs Drain Current

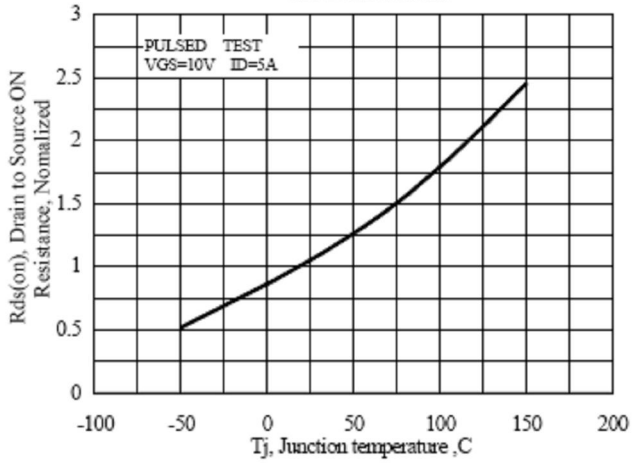


Figure 10 Typical Drian to Source on Resistance vs Junction Temperature

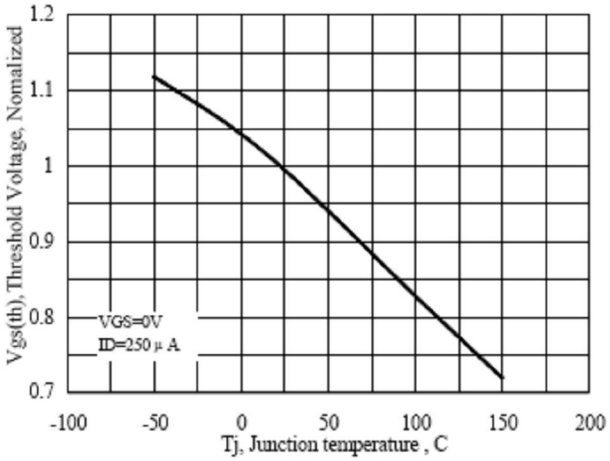


Figure 11 Typical Theshold Voltage vs Junction Temperature

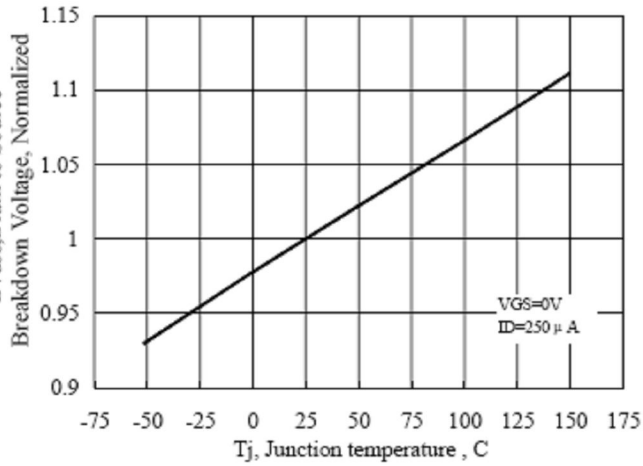


Figure 12 Typical Breakdown Voltage vs Junction Temperature

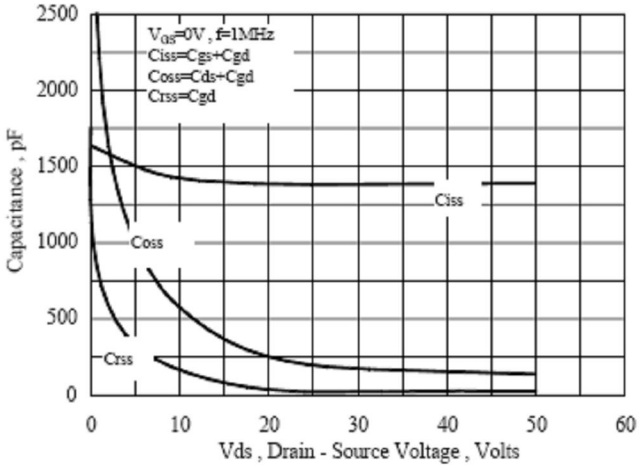


Figure 13 Typical Capacitance vs Drain to Source Voltage

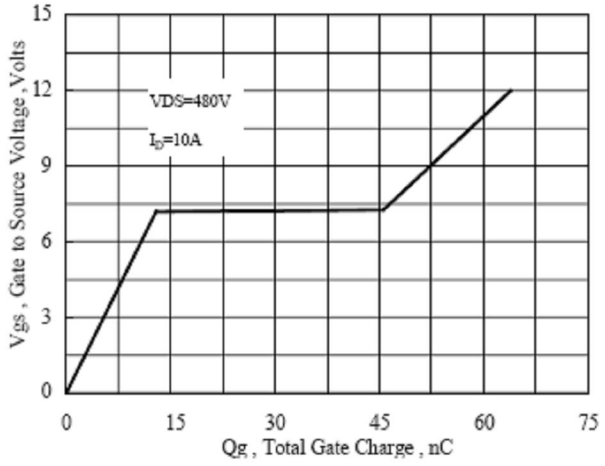


Figure 14 Typical Gate Charge vs Gate to Source Voltage

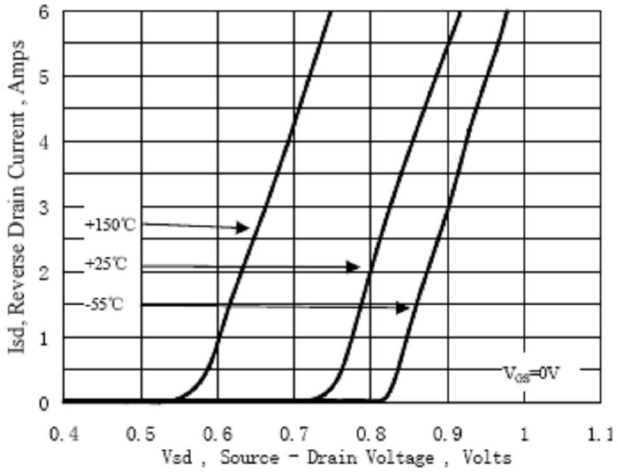


Figure 15 Typical Body Diode Transfer Characteristics

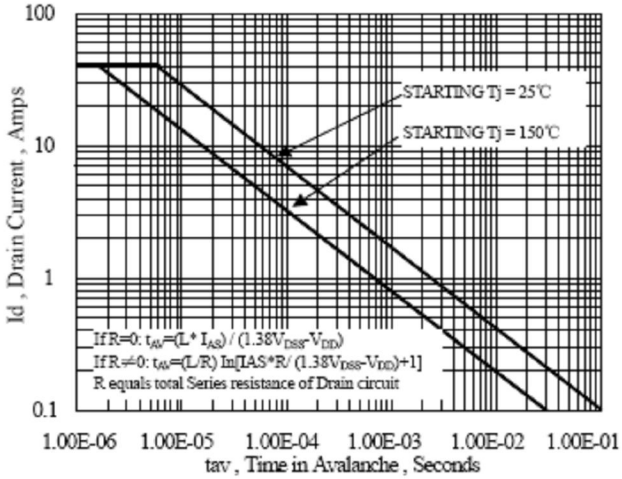
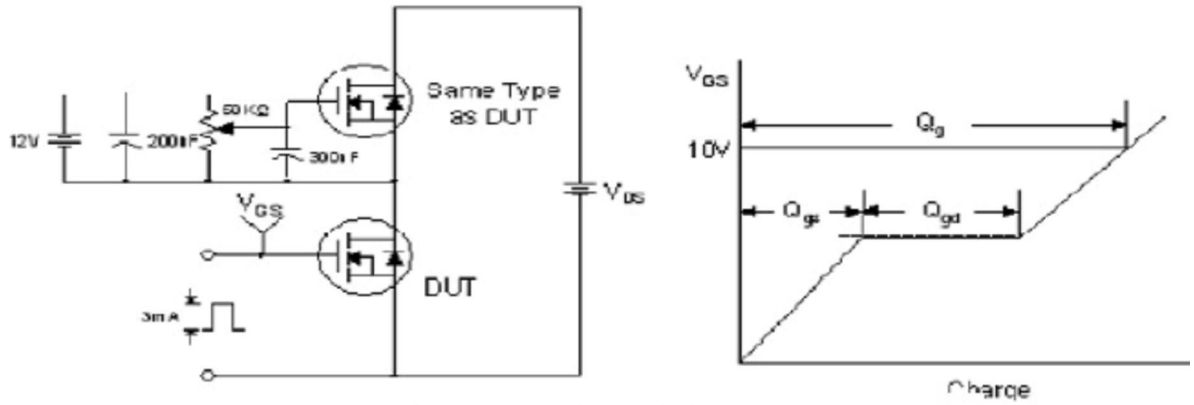
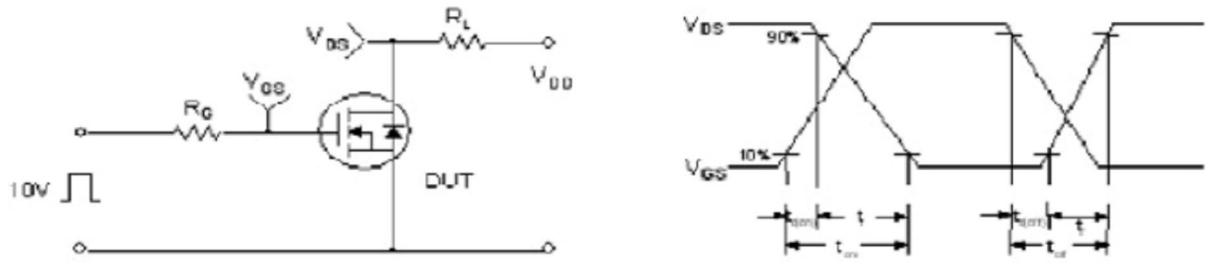


Figure 16 Unclamped Inductive Switching Capability

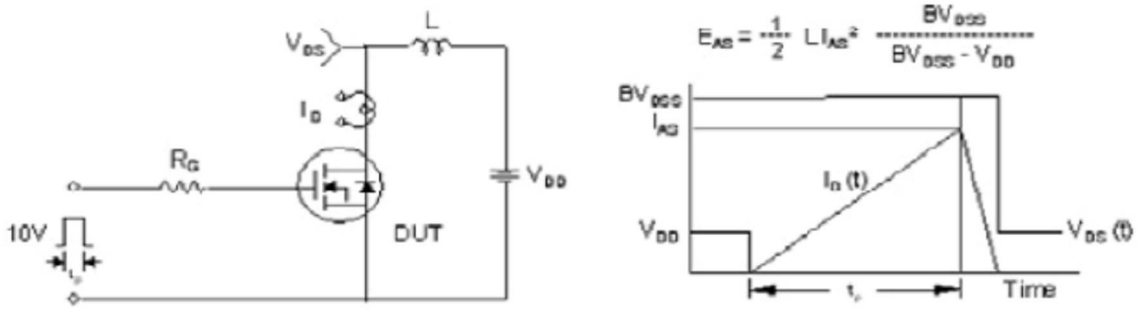
TEST CIRCUIT AND WAVEFORM



Gate Charge Test Circuit and Waveform

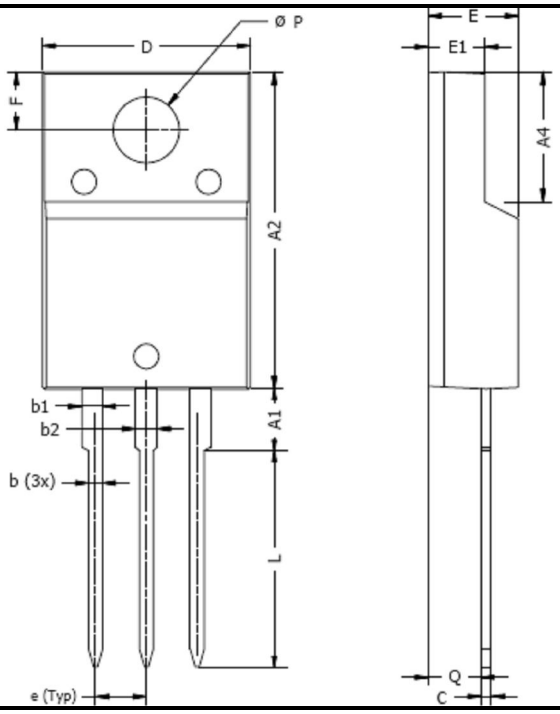


Resistive Switching Test Circuit and Waveform



Unclamped Inductive Switching Test Circuit and Waveform

TO220AB PACKAGE OUTLINE



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A1	2.7	3.3	0.106	0.130
A2	15.0	15.7	0.591	0.618
A4	6.2	6.6	0.244	0.260
b	0.5	0.9	0.020	0.035
b1	0.9	1.2	0.035	0.047
b2	1.0	1.2	0.039	0.047
c	0.4	0.6	0.016	0.024
D	9.8	10.3	0.386	0.406
e	2.34	2.74	0.092	0.108
E	4.3	4.6	0.169	0.181
E1	2.5	2.9	0.098	0.114
F	2.6	3.0	0.102	0.118
L	10.3	10.7	0.406	0.421
ØP	3.0	3.4	0.118	0.134
Q	2.3	2.7	0.091	0.106

Note: Single Gauge

NOTICE

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The product listed herein is designed to be used with ordinary electronic equipment or devices, and not designed to be used with equipment or devices which require high level of reliability and the malfunction of with would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), Tak Cheong Semiconductor Co., Ltd., or anyone on its behalf, assumes no responsibility or liability for any damagers resulting from such improper use of sale.

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