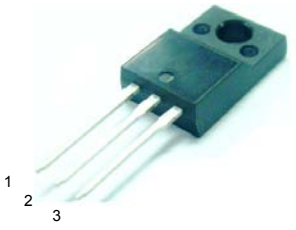
TAK CHEONG®

SEMICONDUCTOR

TFF740

N-Channel Power MOSFET

10A, 400V, 0.55Ω



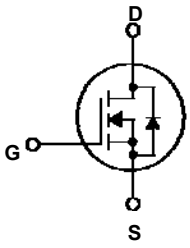
1 = Gate
2 = Drain
3 = Source

TO-220AB

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		400	V
V_{GSS}	Gate-Source Voltage		±30	V
I_D	Drain Current		10	A
I_{DM}	Drain Current Pulsed		40	A
P_D	Power Dissipation	(Note 2)	125	W
	Derating factor above 25℃		1.0	W/℃
E_{AS}	Single Pulsed Avalanche Energy	(Note 1)	680	mJ
E_{AR}	Repetitive Avalanche Energy	(Note 2)	12.5	mJ
T_J	Operating Junction Temperature		150	℃
T_{stg}	Storage Temperature Range		- 55 to +150	℃

Notes:

1. L=18.5mH, I_{AS}=10A, 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	1	℃/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	400	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 400V, V_{GS} = 0V	--	--	1	uA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30V, V_{DS} = 0V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30V, V_{DS} = 0V	--	--	-100	nA

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	--	0.41	0.55	Ω

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Ciss	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	--	830	--	pF
Coss	Output Capacitance		--	140	--	pF
Crss	Reverse Transfer Capacitance		--	40	--	pF

Switching Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 250V, I_D = 10A, R_G = 50 Ω (Note 3 & 4)	--	22	--	nS
tr	Turn-On Rise Time		--	25	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	130	--	nS
tr	Turn-Off Fall Time		--	30	--	nS
Qg	Total Gate Charge	V_{DS} = 320V, I_D = 10A, V_{GS} = 10V (Note 3 & 4)	--	48	--	nC
Qgs	Gate-Source Charge		--	7	--	nC
Qgd	Gate-Drain Charge		--	20	--	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)	--	335	--	nS
Qrr	Reverse Recovery Charge		--	3.6	--	uC

Notes:
3. Pulse Test: Pulse width < 300us, Duty cycle ≤ 2%.
4. Basically not affected by working temperature.

TYPICAL CHARACTERISTICS

Fig 1. On-State Characteristics

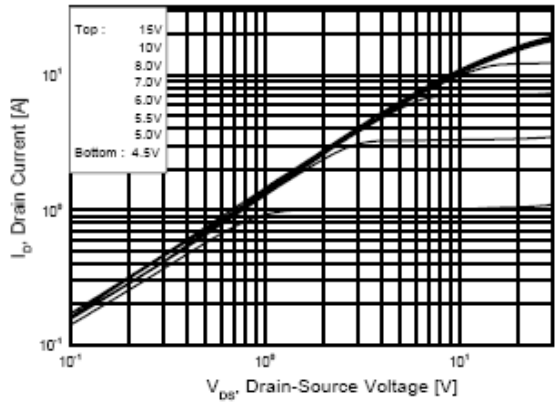


Fig 2. Transfer Characteristics

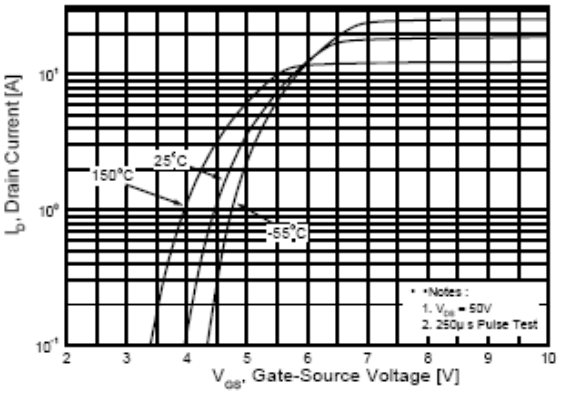


Fig 3. On Resistance Variation vs. Drain Current and Gate Voltage

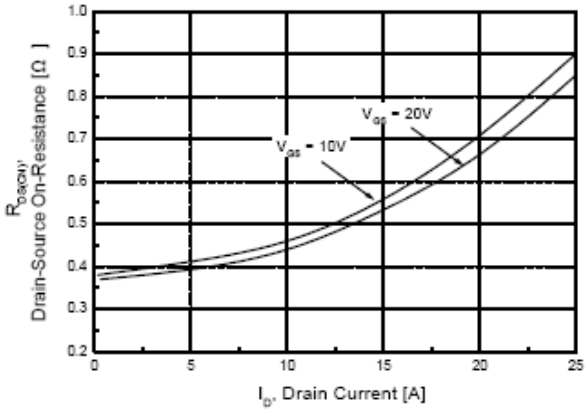


Fig 4. On State Current vs. Allowable Case Temperature

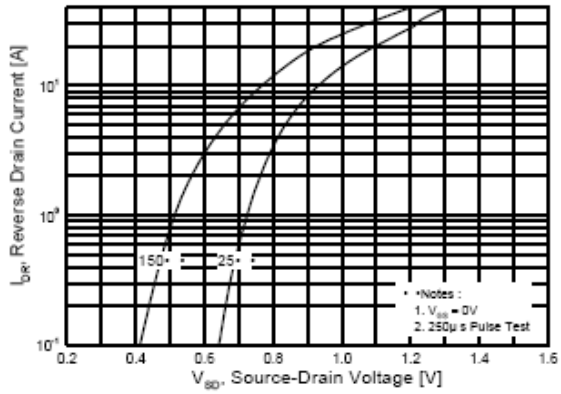


Fig 5. Capacitance Characteristics

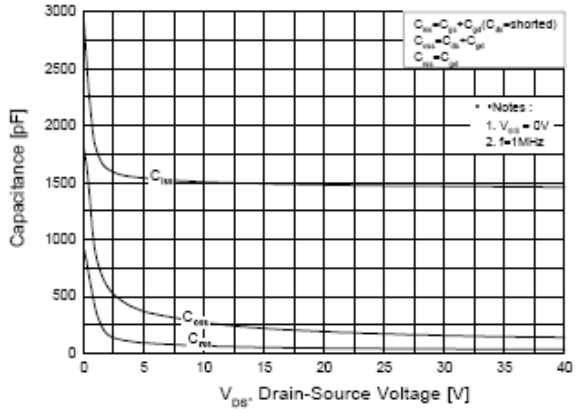


Fig 6. Gate Charge Characteristics

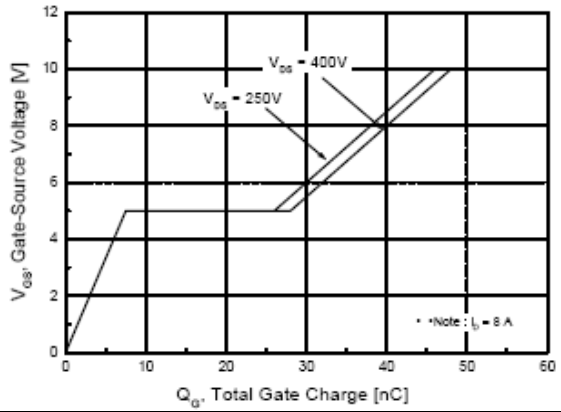


Fig 7. Breakdown Voltage Variation

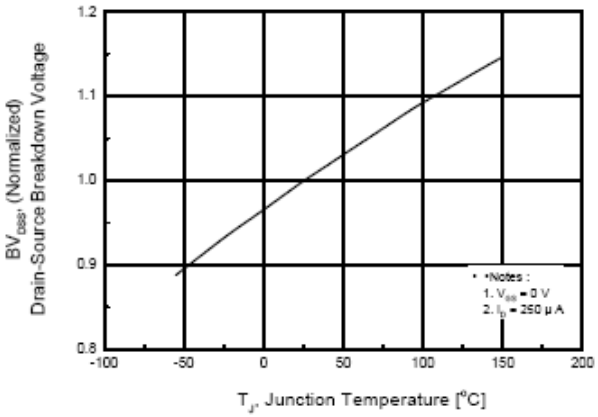


Fig 8. On-Resistance Variation

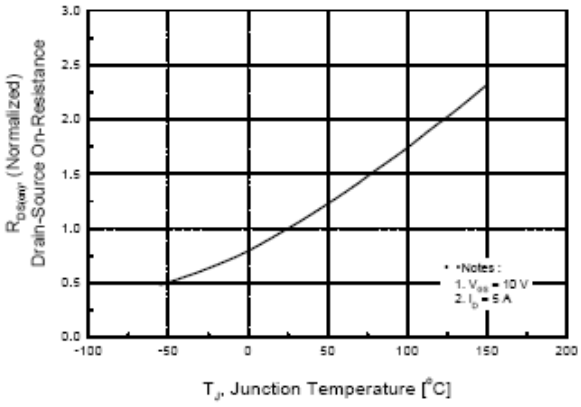


Fig 9. Maximum Safe Operating Area

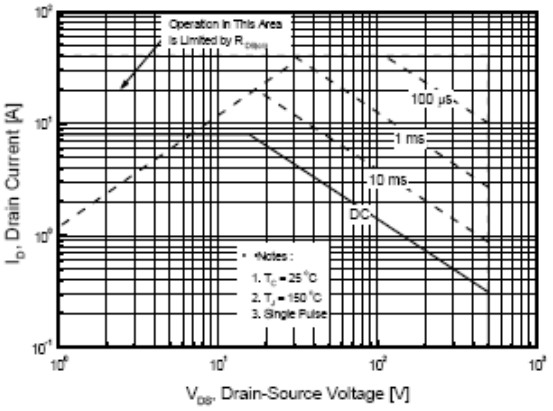


Fig 10. Maximum Drain Current vs. Case Temperature

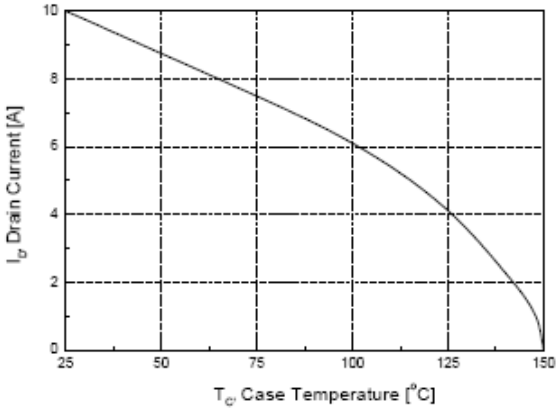


Fig 11. Transient Thermal Response Curve

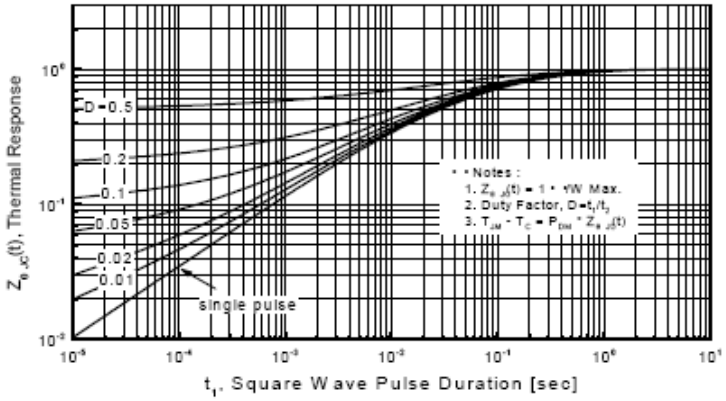


Fig. 12. Gate Charge Test Circuit & Waveforms

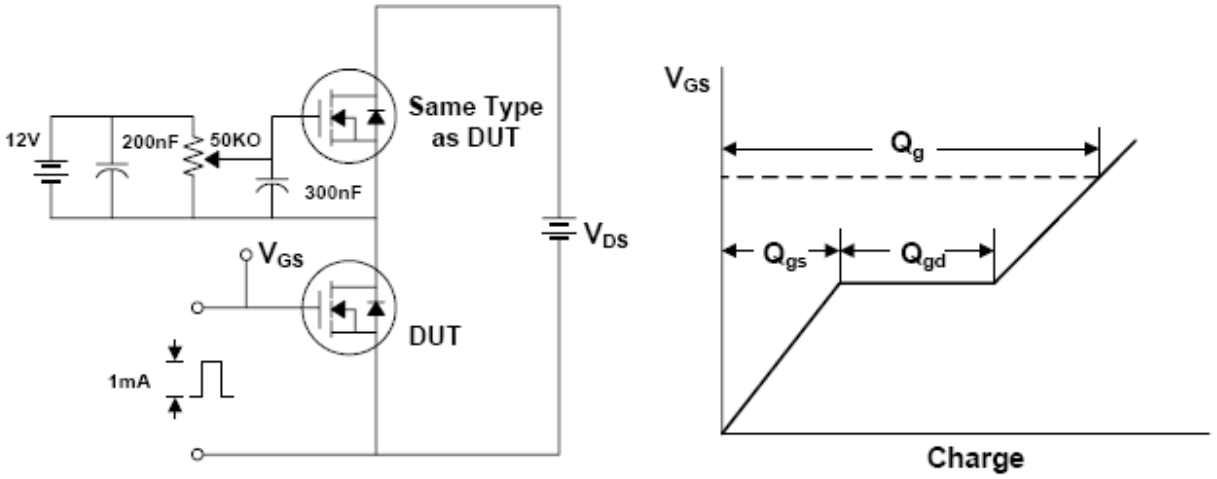


Fig 13. Switching Time Test Circuit & Waveforms

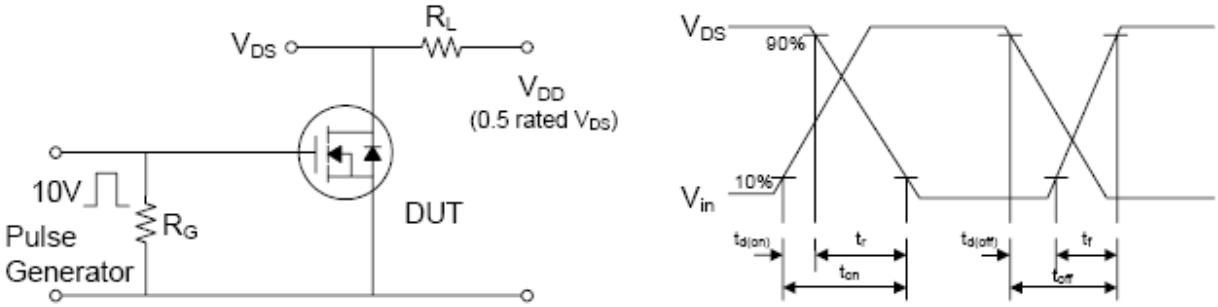
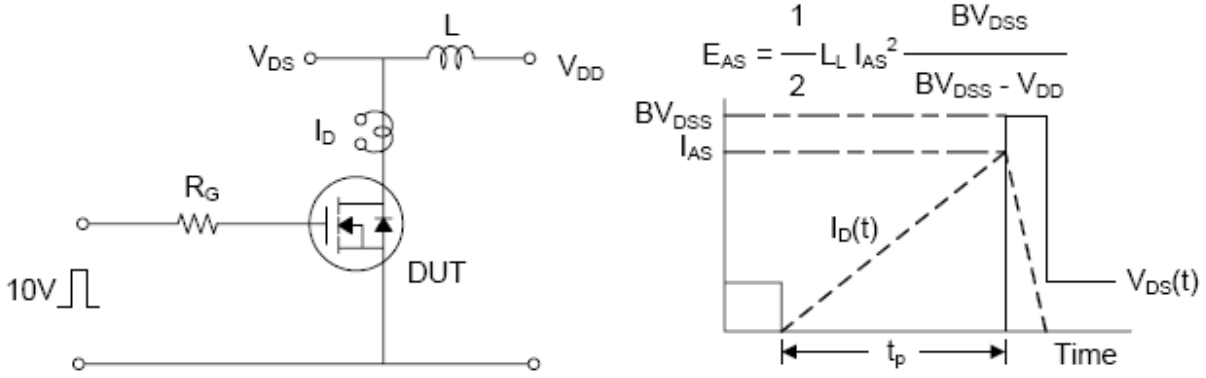
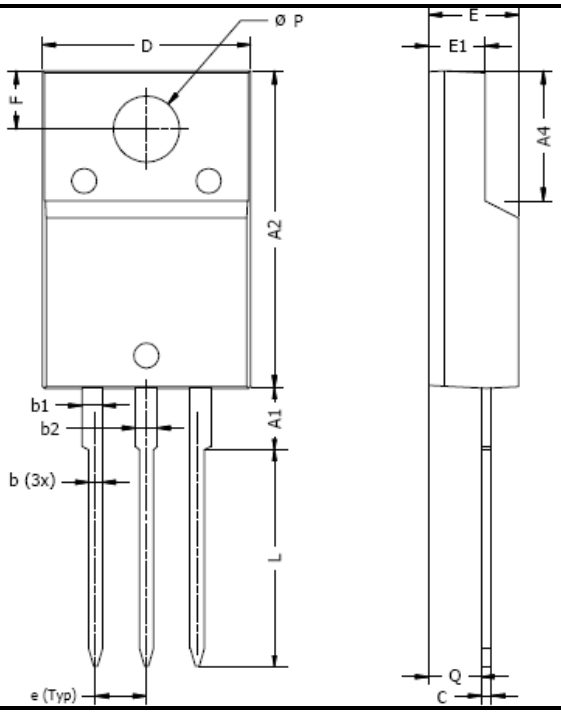


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms



TO220FP 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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