

Pb Free Plating Product

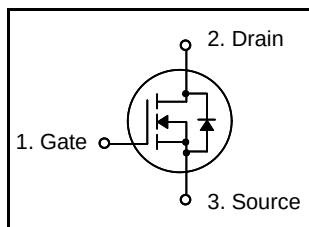
TSF10N60C



10.3A, 600V Insulated N-Channel Type Power MOSFET

Features

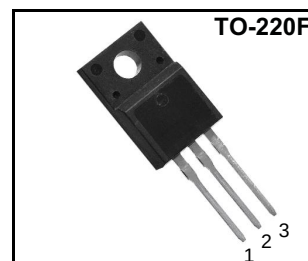
- $R_{DS(on)}$ (Max 0.75 Ω) @ $V_{GS}=10V$
- Gate Charge (Typical 45nC)
- Improved dv/dt Capability
- High ruggedness
- 100% Avalanche Tested

 $BV_{DSS} = 600V$ $R_{DS(on)} = 0.75 \text{ ohm}$ $I_D = 10.3A$

General Description

This N-channel enhancement mode field-effect power transistor using THINKI Semiconductor advanced planar stripe, DMOS technology intended for off-line switch mode power supply.

Also, especially designed to minimize $r_{ds(on)}$ and high rugged avalanche characteristics. The TO-220F pkg is well suited for adaptor power unit and small power inverter application.



Absolute Maximum Ratings

Symbol	Parameter	Value		Units
		TSP10N60C	TSF10N60C	
V_{DSS}	Drain to Source Voltage	600		V
I_D	Continuous Drain Current(@ $T_C = 25^\circ C$)	10.3	10.3*	A
	Continuous Drain Current(@ $T_C = 100^\circ C$)	6.5	6.5*	A
I_{DM}	Drain Current Pulsed (Note 1)	41.2	41.2*	A
V_{GS}	Gate to Source Voltage	± 30		V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	822		mJ
E_{AR}	Repetitive Avalanche Energy (Note 1)	15.8		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5.0		V/ns
P_D	Total Power Dissipation(@ $T_C = 25^\circ C$)	158	57	W
	Derating Factor above $25^\circ C$	1.27	0.45	W/ $^\circ C$
T_{STG}, T_J	Operating Junction Temperature & Storage Temperature	$-55 \sim +150$		$^\circ C$
T_L	Maximum Lead Temperature for soldering purpose, 1/8 from Case for 5 seconds.	300		$^\circ C$

*. Drain current is limited by junction temperature.

Thermal Characteristics

Symbol	Parameter	Maximum value		Units
		TSP10N60C	TSF10N60C	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.79	2.21	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	62.5	62.5	$^\circ C/W$

Electrical Characteristics ($T_C = 25\text{ }^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250uA	600	-	-	V
Δ BV _{DSS} / Δ T _J	Breakdown Voltage Temperature coefficient	I _D = 250uA, referenced to 25 °C	-	0.56	-	V/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =600V, V _{GS} = 0V	-	-	1	uA
		V _{DS} = 480V, T _C = 125 °C	-	-	10	uA
I _{GSS}	Gate-Source Leakage, Forward	V _{GS} = 30V, V _{DS} = 0V	-	-	100	nA
	Gate-source Leakage, Reverse	V _{GS} = -30V, V _{DS} = 0V	-	-	-100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250uA	2.0	-	4.0	V
R _{DS(ON)}	Static Drain-Source On-state Resistance	V _{GS} =10 V, I _D =5.15A	-	0.61	0.75	Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{GS} = 0 V, V _{DS} =25V, f = 1MHz	-	805	1046	pF
C _{oss}	Output Capacitance		-	155	202	
C _{rss}	Reverse Transfer Capacitance		-	21	27	
Dynamic Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} =300V, I _D =10.3A, R _G =25 Ω * see fig. 13. (Note 4, 5)	-	25	60	ns
t _r	Rise Time		-	85	180	
t _{d(off)}	Turn-off Delay Time		-	133	276	
t _f	Fall Time		-	53	116	
Q _g	Total Gate Charge	V _{DS} =480V, V _{GS} =10V, I _D =10.3A	-	45	56	nC
Q _{gs}	Gate-Source Charge		-	9	-	
Q _{gd}	Gate-Drain Charge(Miller Charge)		* see fig. 12. (Note 4, 5)	-	12.4	

Source-Drain Diode Ratings and Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit.
I_S	Continuous Source Current	Integral Reverse p-n Junction Diode in the MOSFET	-	-	10.3*	A
I_{SM}	Pulsed Source Current		-	-	41.2*	
V_{SD}	Diode Forward Voltage	$I_S = 10.3A, V_{GS} = 0V$	-	-	1.5	V
t_{rr}	Reverse Recovery Time	$I_S = 10.3A, V_{GS} = 0V, dI_F/dt = 100A/\mu s$	-	403	-	ns
Q_{rr}	Reverse Recovery Charge		-	4.8	-	μC

*** NOTES**

1. Repeatability rating : pulse width limited by junction temperature
2. $L = 14.2\text{mH}$, $I_{AS} = 10.3A$, $V_{DD} = 50V$, $R_G = 50\Omega$, Starting $T_J = 25^{\circ}\text{C}$
3. $I_{SD} \leq 10.3A$, $dI/dt \leq 300A/\mu s$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$
4. Pulse Test : Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$
5. Essentially independent of operating temperature.

Fig 1. On-State Characteristics

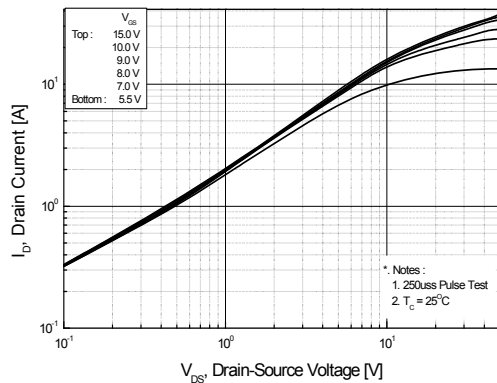


Fig 2. Transfer Characteristics

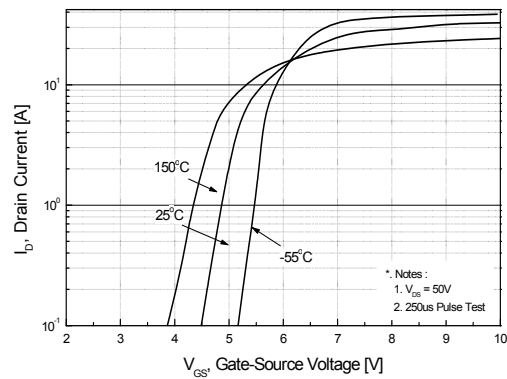


Fig 3. On Resistance Variation vs. Drain Current and Gate Voltage

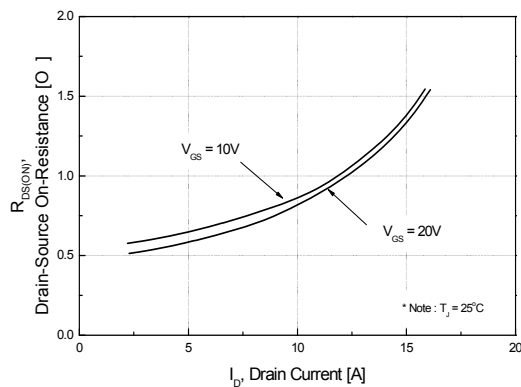


Fig 4. On State Current vs. Allowable Case Temperature

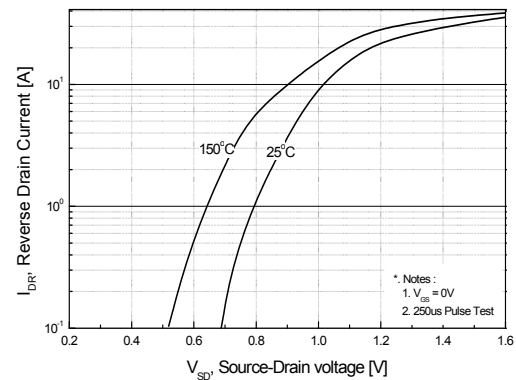


Fig 5. Capacitance Characteristics (Non-Repetitive)

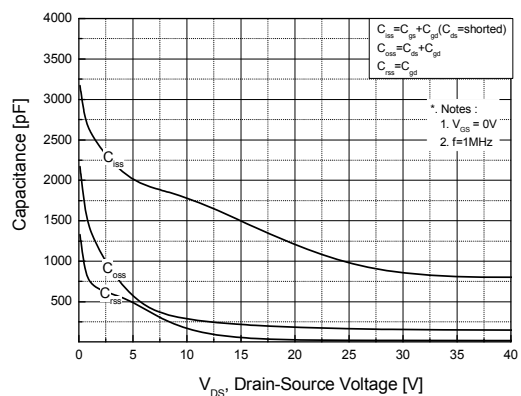


Fig 6. Gate Charge Characteristics

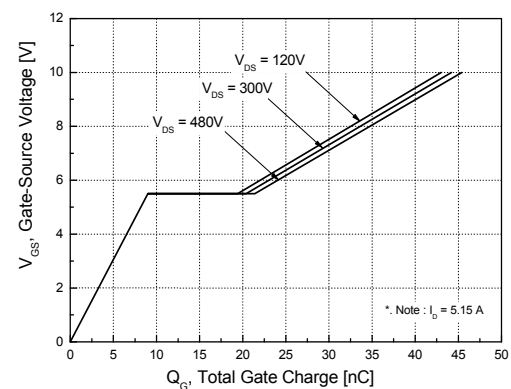


Fig 7. Breakdown Voltage Variation vs. Junction Temperature

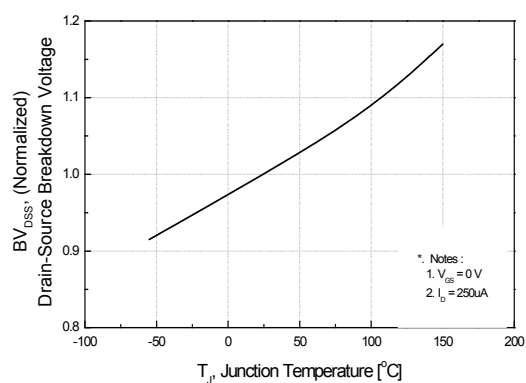


Fig 8. On-Resistance Variation vs. Junction Temperature

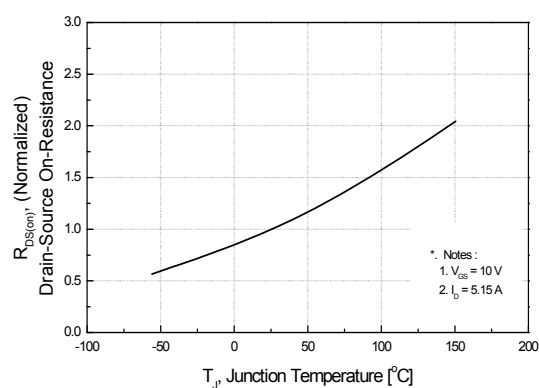


Fig 9. Maximum Safe Operating Area

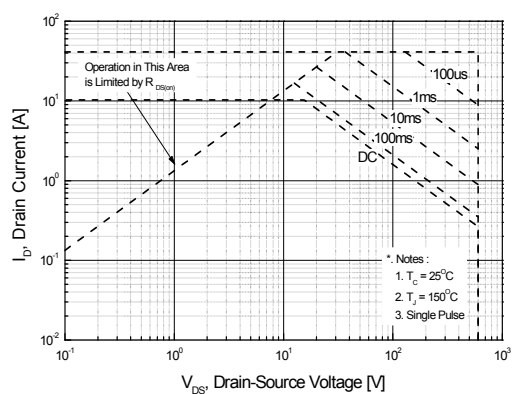


Fig 10. Maximum Safe Operating Area (TO-220F)

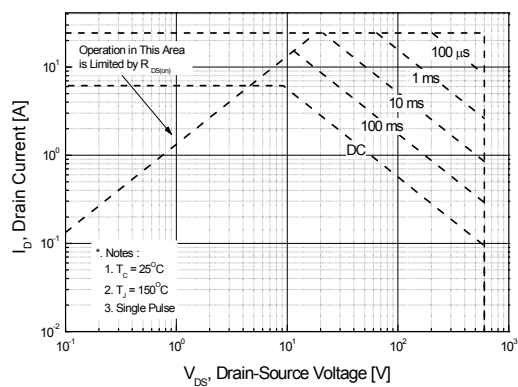


Fig 11. Maximum Drain Current vs. Case Temperature. (TO220)

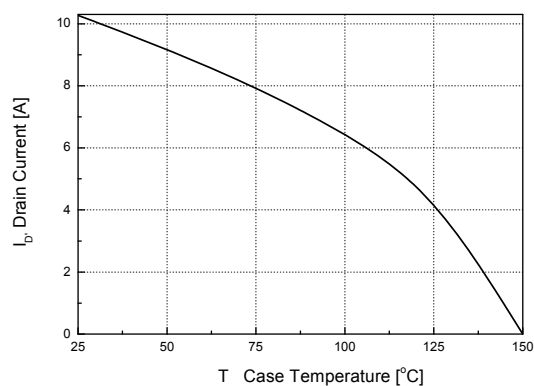


Fig 12. Maximum Drain Current vs. Case Temperature. (TO220F)

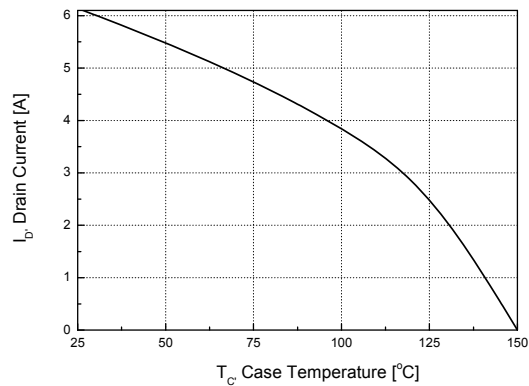


Fig 13. Transient Thermal Response Curve(TO220)

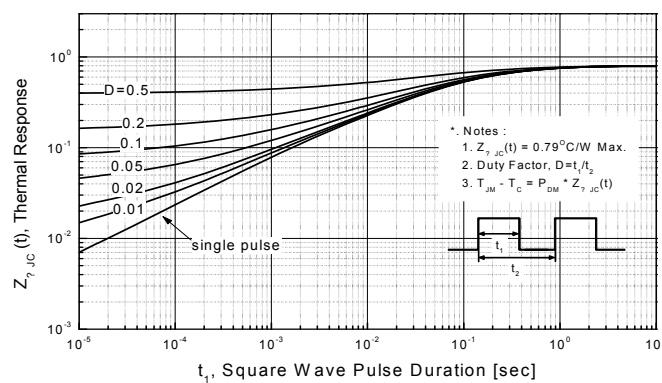


Fig 14. Transient Thermal Response Curve(TO220F)

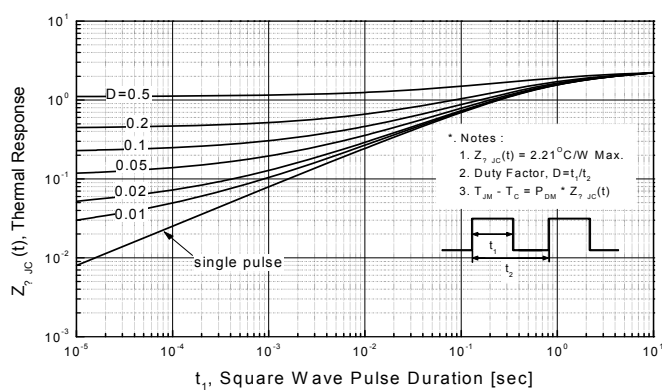


Fig. 12. Gate Charge Test Circuit & Waveforms

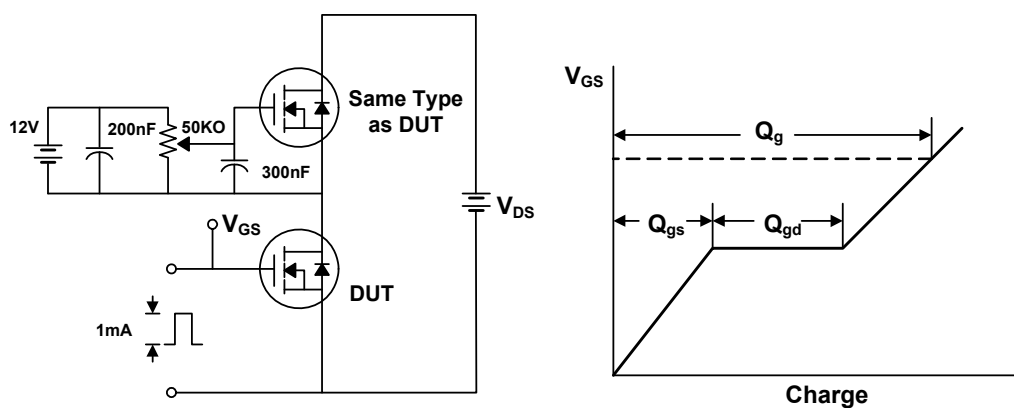


Fig 13. Switching Time Test Circuit & Waveforms

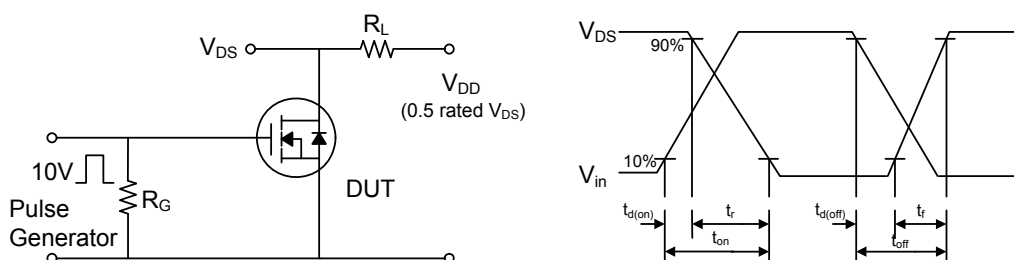


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms

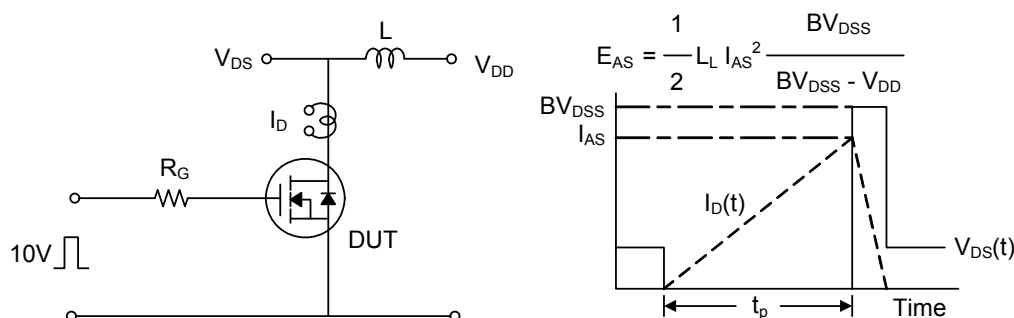


Fig. 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

