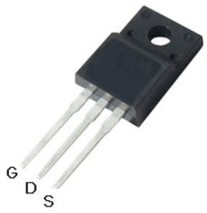
Features

- 650V, 4A
- $R_{DS(ON)}$ = 2.5Ω (Max.) @ V_{GS} = 10V, I_D = 2A
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- RoHS and Halogen-Free Compliant

Application

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)

Package



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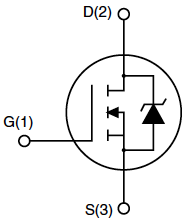


Absolute Maximum Ratings T_C=25℃ unless otherwise specified

Symbol	Parameter		Max.	Units
V_{DSS}	Drain-Source Voltage		650	V
V_{GSS}	Gate-Source Voltage		± 30	V
I_D	Continuous Drain Current note5	T_C = 25℃	4	A
I_{DM}	Pulsed Drain Current note3		16	A
P_D	Power Dissipation note2	T_C = 25℃	32	W
E_{AS}	Single Pulse Avalanche Energy note3.6		173	mJ
$R_{\theta JC}$	Thermal Resistance, Junction to Case		3.9	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient note1,4		62.5	℃/W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150	℃

Electrical Characteristics T_C=25℃ unless otherwise specified

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	650	-	-	V
I_{DSS}	Drain-Source Leakage Current	V_{DS} = 650V, V_{GS} = 0V	-	-	1	μA
I_{GSS}	Gate to Body Leakage Current	V_{DS} = 0V, V_{GS} = ±30V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	2	-	4	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	V_{GS} = 10V, I_D = 2A	-	-	2.5	Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25V, V_{GS} = 0V, f = 1.0MHz	-	560	-	pF
C_{oss}	Output Capacitance		-	55	-	pF
C_{rss}	Reverse Transfer Capacitance		-	5	-	pF
Switching Characteristics						
Q_g	Total Gate Charge	V_{DS}= 520V, I_D = 4A, V_{GS} = 10V	-	13	-	nC
Q_{gs}	Gate-Source Charge		-	4	-	
Q_{gd}	Gate-Drain(“Miller”) Charge		-	2.2	-	
$t_{d(on)}$	Turn-On Delay Time	V_{DS} = 100V, I_D = 4A, R_G = 25Ω, V_{GS}=10V	-	7	-	ns
t_r	Turn-On Rise Time		-	16	-	
$t_{d(off)}$	Turn-Off Delay Time		-	36	-	
t_f	Turn-Off Fall Time		-	22	-	
Diode Characteristics						
V_{SD}	Diode Forward Voltage note3	I_S=4A . V_{GS} = 0V	-	-	1.4	V
t_{rr}	Reverse Recovery Time	I_{SD}=4A, V_{GS} = 0V dI$_{SD}$/dt=100A/μs	-	250	-	ns
Q_{rr}	Reverse Recovery Charge		-	4.5	-	nC

Notes:

1. The value of $R_{\theta JC}$ is measured in a still air environment with TA =25°C and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.

2. The power dissipation P_D is based on $T_{J(MAX)}$=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

3. Single pulse width limited by junction temperature $T_{J(MAX)}$=150°C.

4. The $R_{\theta JA}$ is the sum of the thermal impedance from junction to case $R_{\theta JC}$ and case to ambient.

5. The maximum current rating is package limited.

6. The EAS data shows Max. rating. The test condition is V_{DS}=50V,V_{GS}=10V,L=30mH

Typical Performance Characteristics

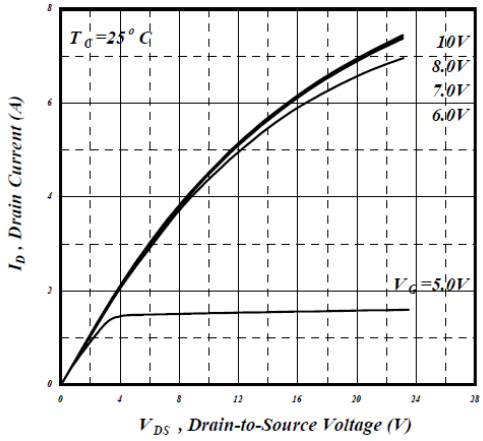


Figure 1. Output Characteristics

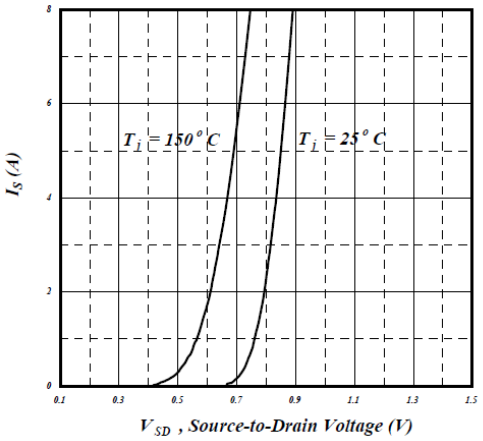


Figure 2. Body Diode Forward Voltage vs Source Current and Temperature

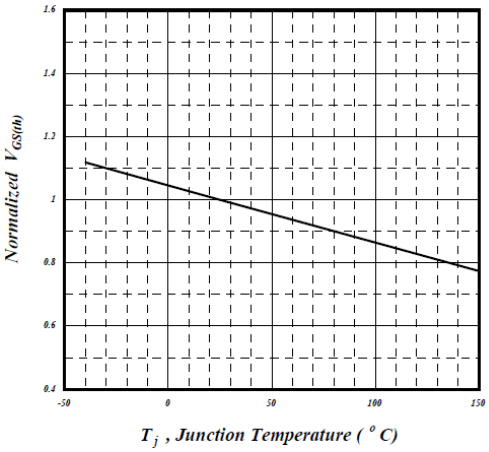


Figure 3. Normalized On Resistance vs Junction Temperature

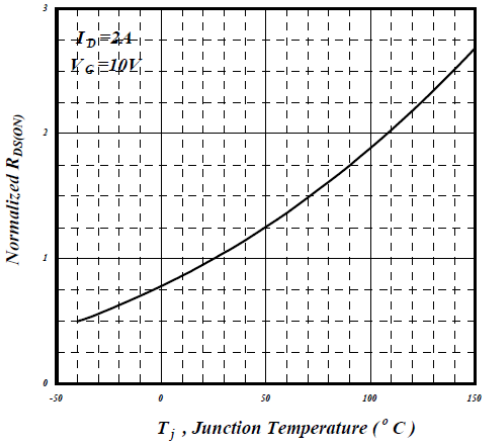


Figure 4. Normalized On Resistance vs Junction Temperature

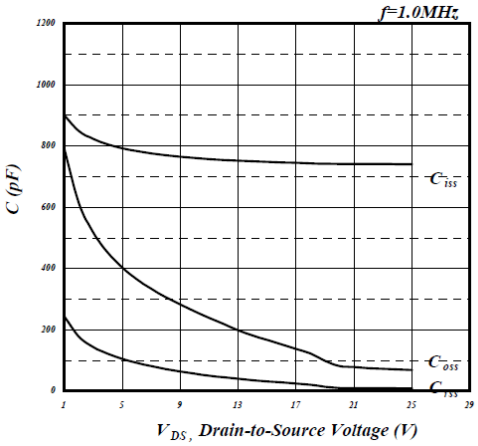


Figure 5. Capacitance Characteristics

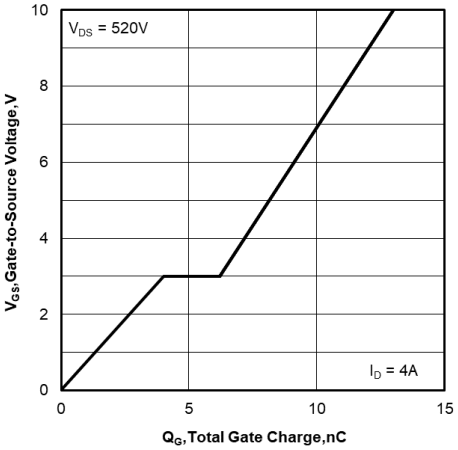


Figure 6. Gate Charge Characteristics

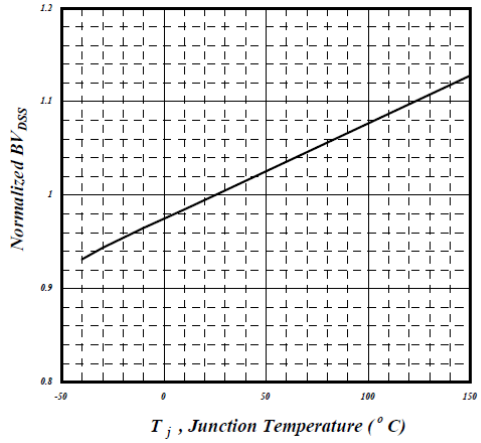


Figure 7. Normalized Breakdown Voltage vs Junction Temperature

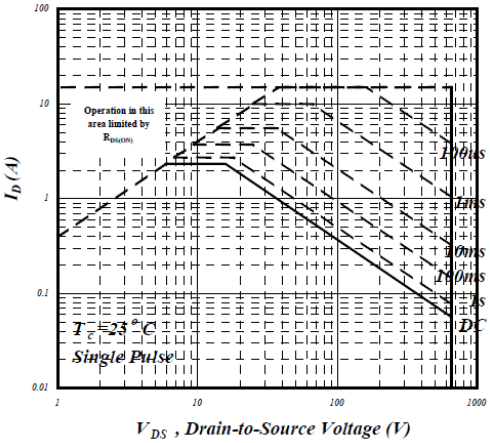


Figure 8. Maximum Safe Operating Area

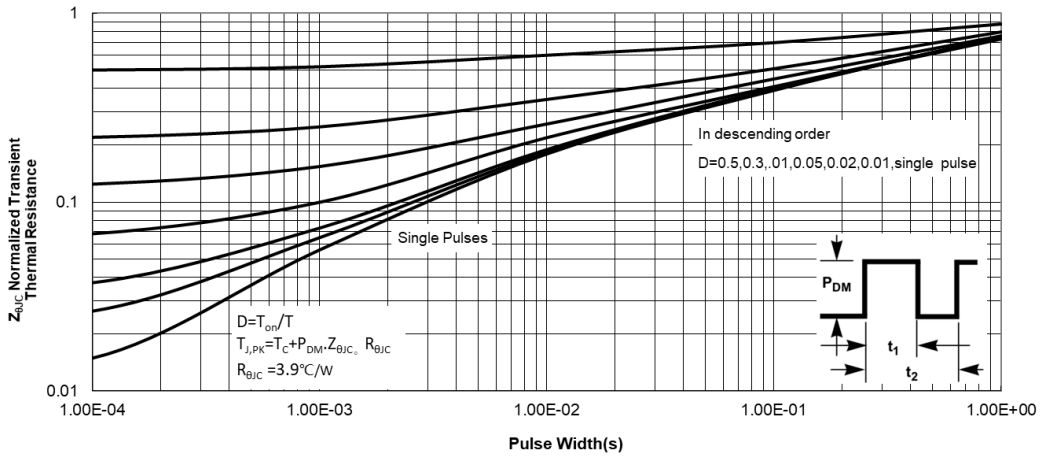
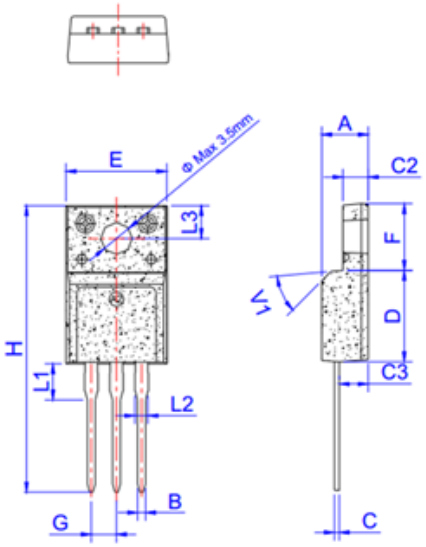


Figure 9. Maximum Effective Transient Thermal Impedance, Junction-to-Case

TO-220F-3L Package Mechanical Data



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.50		4.90	0.177		0.193
B	0.74	0.80	0.83	0.029	0.031	0.033
C	0.47		0.65	0.019		0.026
C2	2.45		2.75	0.096		0.108
C3	2.60		3.00	0.102		0.118
D	8.80		9.30	0.346		0.366
E	9.80		10.4	0.386		0.410
F	6.40		6.80	0.252		0.268
G		2.54			0.1	
H	28.0		29.8	1.102		1.173
L1		3.63			0.143	
L2	1.14		1.70	0.045		0.067
L3		3.30			0.130	
V1		45°			45°	

NOTE:

1.We strongly recommend customers check carefully on the trademark when buying our product, if there is any question, please don't be hesitate to contact us.

2.Please do not exceed the absolute maximum ratings of the device when circuit designing.

3.Winsemi Microelectronics Co., Ltd reserved the right to make changes in this specification sheet and is subject to change without prior notice.

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