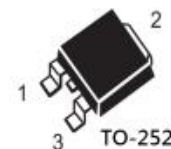
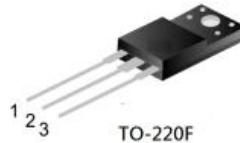
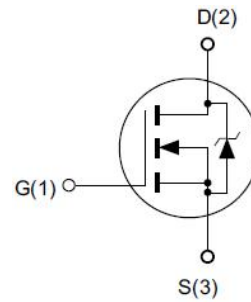


Features

- ◆ 650V, 4A, $R_{DS(ON)}(Max.) = 2.5\Omega @ V_{GS} = 10V$.
- ◆ Low C_{rss}
- ◆ Fast Switching
- ◆ 100% Avalanche Tested

Application

- ◆ Charger
- ◆ Standby Power



Absolute Maximum Ratings $T_c = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Limit		Unit
		TO-220F	TO-252	
V_{DS}	Drain-Source Voltage ^a	650		V
V_{GS}	Gate-Source Voltage	± 30		V
I_D	Drain Current-Continuous, $T_c = 25^\circ\text{C}$	4		A
	Drain Current-Continuous, $T_c = 100^\circ\text{C}$	2.5		A
I_{DM}	Drain Current-Pulsed ^b	16		A
P_D	Maximum Power Dissipation @ $T_J = 25^\circ\text{C}$	33	77	W
E_{AS}	Single Pulsed Avalanche Energy ^d	200		mJ
T_J, T_{STG}	Operating and Store Temperature Range	-55 to 150		$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Value		Unit
		TO-220F	TO-252	
$R_{\theta JC}$	Thermal Resistance, Junction-Case Max.	3.5	1.5	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient Max	62.5	110	$^\circ\text{C}/\text{W}$

Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

Off Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu\text{A}$	650	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 650V, V_{GS} = 0V$	-	-	1	μA
I_{GSS}	Forward Gate Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 30V$	-	-	± 100	nA

On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2	-	4	V
$R_{DS(on)}$	Static Drain-Source On-Resistance ^c	$V_{GS} = 10V, I_D = 2A$	-	2.1	2.5	Ω

Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	$V_{DS} = 25V,$ $V_{GS} = 0V,$ $f = 1.0MHz$	-	610	-	pF
C_{oss}	Output Capacitance		-	53	-	pF
C_{rss}	Reverse Transfer Capacitance		-	3.5	-	pF

On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 325V, I_D = 4A,$ $R_G = 25\Omega, V_{GS} = 10V$	-	12.7	-	ns
t_r	Turn-On Rise Time		-	17.4	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	30.9	-	ns
t_f	Turn-Off Fall Time		-	10.5	-	ns
Q_g	Total Gate Charge	$V_{DS} = 520V, I_D = 4A,$ $V_{GS} = 10V$	-	14.2	-	nC
Q_{gs}	Gate-Source Charge		-	5.5	-	nC
Q_{gd}	Gate-Drain Charge		-	3.8	-	nC

Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_S	Drain-Source Diode Forward Continuous Current	$V_{GS} = 0V$	-	-	4	A
I_{SM}	Maximum Pulsed Current	$V_{GS} = 0V$	-	-	16	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_S = 4A$	-	-	1.4	V
T_{rr}	Body Diode Reverse Recovery Time	$di/dt = 100A/us$ $I_F = 4A$	-	264	-	ns

Notes:

- $T_J = +25^\circ C$ to $+150^\circ C$
- Repetitive rating; pulse width limited by maximum junction temperature.
- Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$

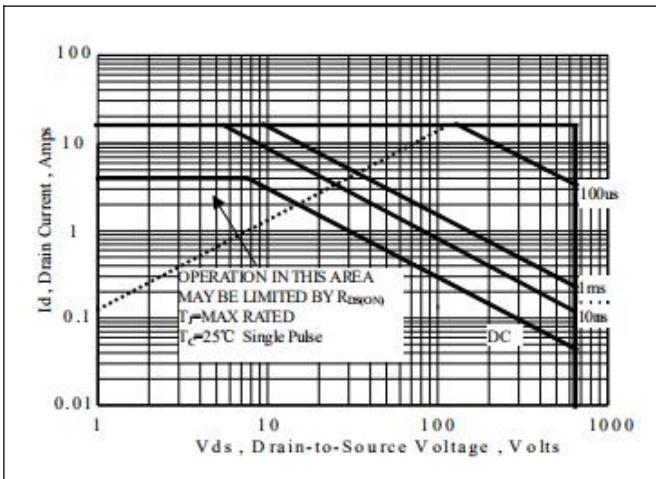


Figure 1 Maximum Safe Operating Area

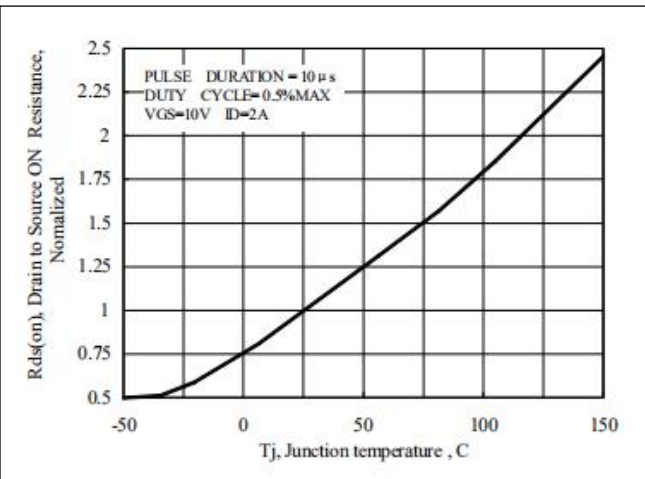


Figure 2. Normalized On-Resistance Variation with Temperature

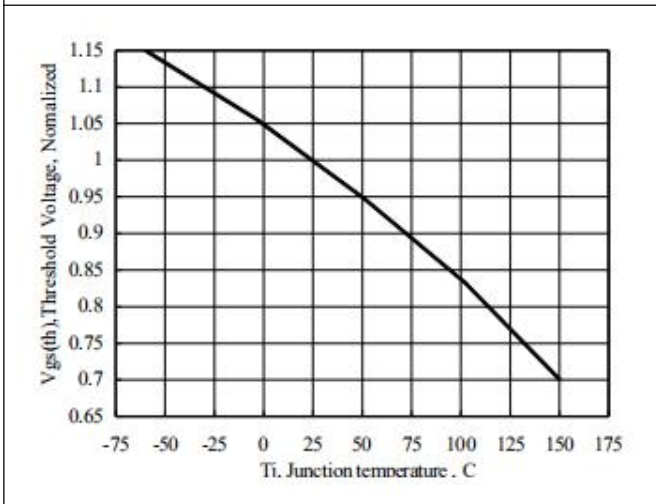


Figure 3. Typical Threshold Voltage vs Junction Temperature

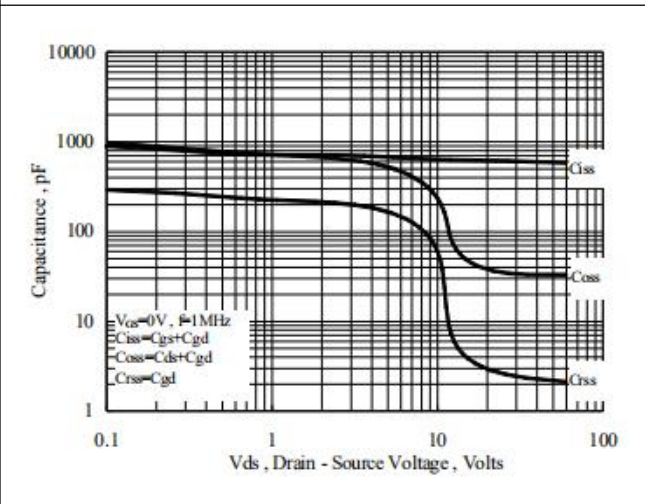


Figure 4. Capacitance Characteristics

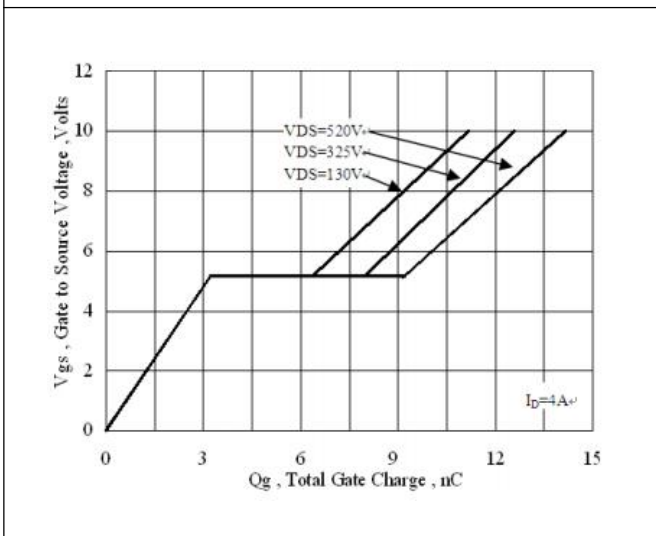


Figure 5. Gate Charge Characteristics

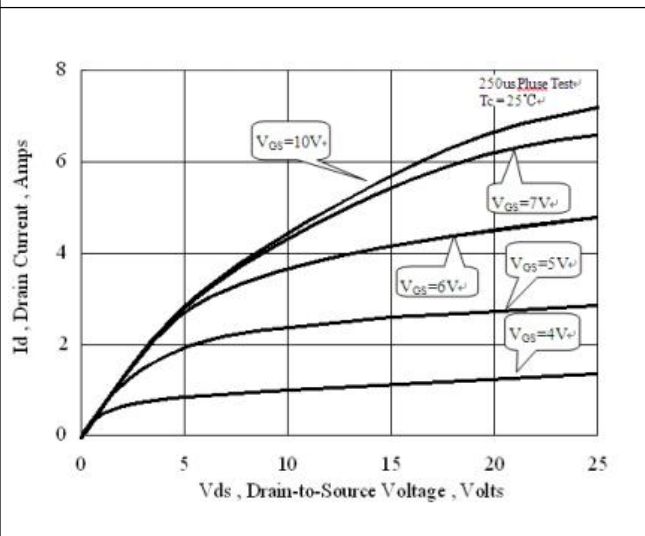


Figure 6. On-State Characteristics

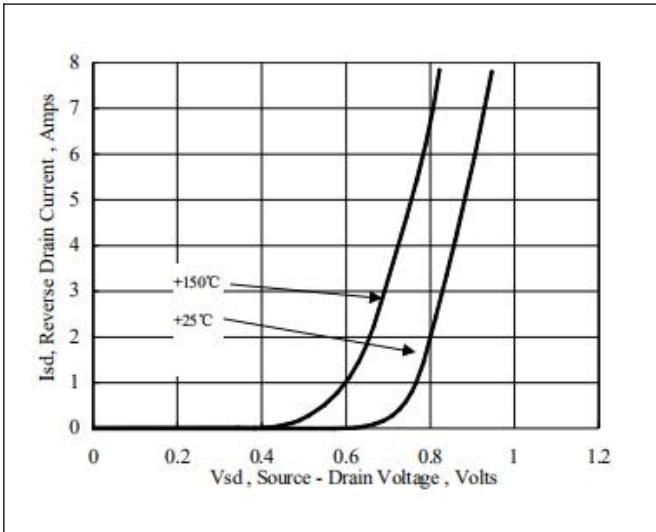


Figure 7. Typical Body Diode Transfer Characteristics

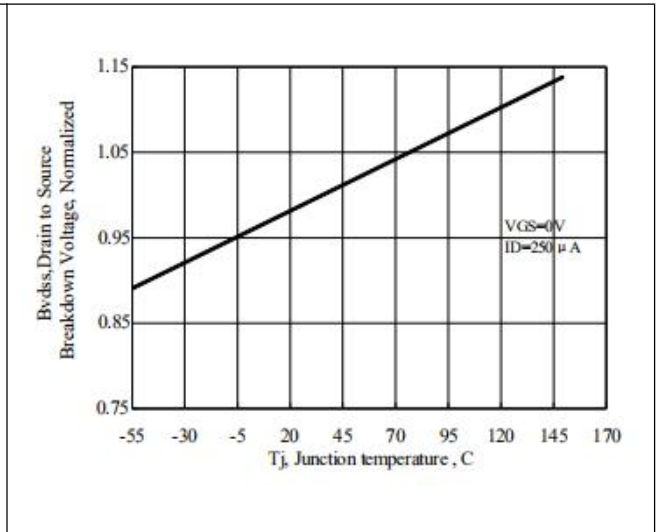


Figure 8. Typical Breakdown Voltage vs Junction Temperature

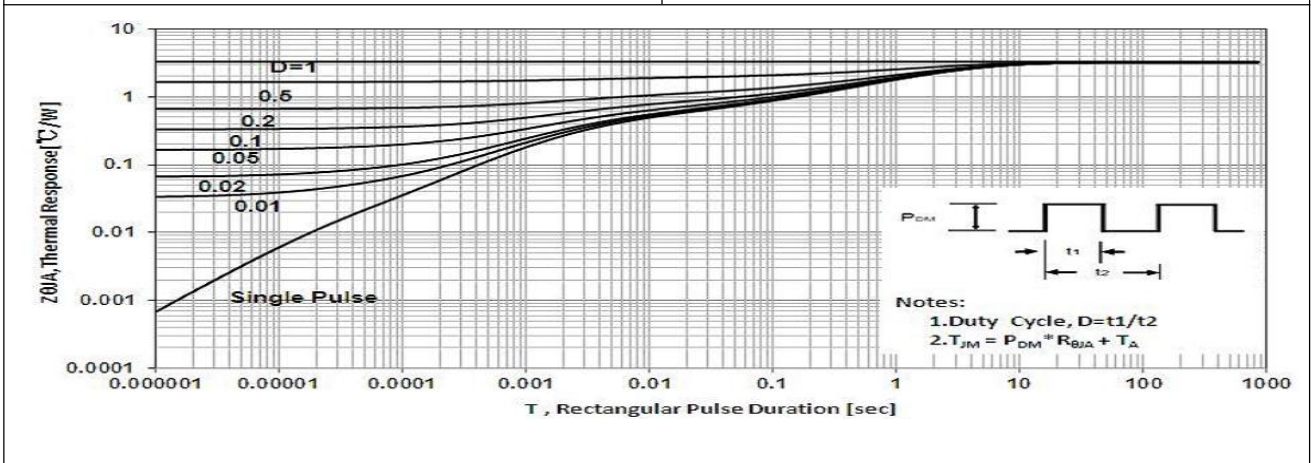


Figure 9. Normalized Effective Transient Thermal Impedance With Pulse Duration (TO-220F)

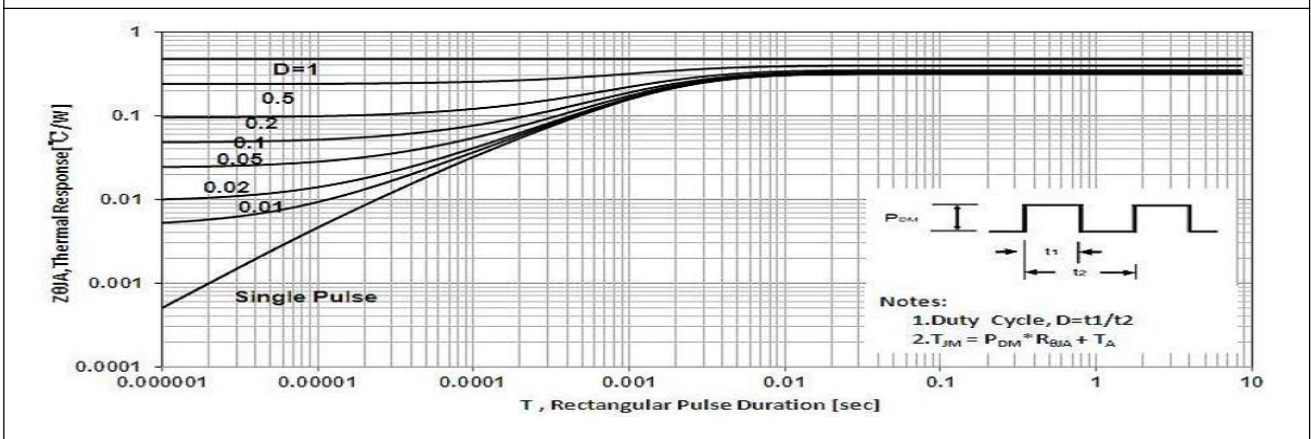


Figure 10. Normalized Effective Transient Thermal Impedance With Pulse Duration (TO-252)