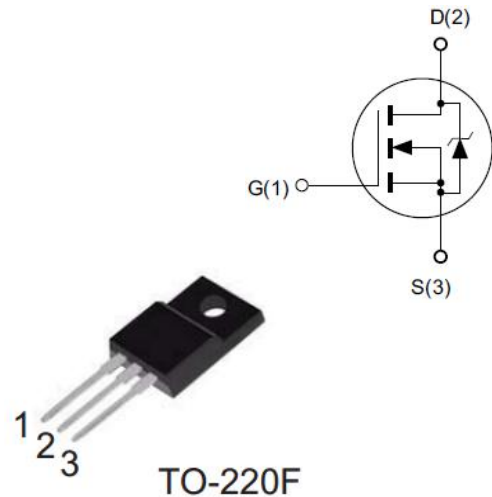


Features

- ◆ 650V, 12A, $R_{DS(ON)}(Max.) = 0.75\Omega @ V_{GS} = 10V$.
- ◆ Low C_{rss}
- ◆ Fast Switching
- ◆ 100% Avalanche Tested

Application

- ◆ Adapter
- ◆ LCD Panel Power
- ◆ E-Bike Charger
- ◆ Switching Mode Power Supply



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

Symbol	Parameter	Limit	Unit
		TO-220F	
V_{DS}	Drain-Source Voltage ^a	650	V
V_{GS}	Gate-Source Voltage	± 30	V
I_D	Drain Current-Continuous, $T_c = 25^\circ\text{C}$	12	A
	Drain Current-Continuous, $T_c = 100^\circ\text{C}$	7.5	A
I_{DM}	Drain Current-Pulsed ^b	48	A
P_D	Maximum Power Dissipation @ $T_J = 25^\circ\text{C}$	42	W
EAS	Single Pulsed Avalanche Energy ^d	320	mJ
T_J, T_{STG}	Operating and Store Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta Jc}$	Thermal Resistance, Junction-Case ^{Max}	2.98	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient Max	62.5	$^\circ\text{C}/\text{W}$

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

N-Channel Power MOSFET

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	$V_{GS} = 10V, I_D = 6A$	-	0.62	0.75	Ω

Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	$V_{DS} = 25V,$ $V_{GS} = 0V,$ $f = 1.0MHz$	-	2022	-	pF
C_{oss}	Output Capacitance		-	170	-	pF
C_{rss}	Reverse Transfer Capacitance		-	7	-	pF

On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 325V, I_D = 12A,$ $R_G = 10\Omega, V_{GS} = 10V$	-	29	-	ns
t_r	Turn-On Rise Time		-	27	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	65	-	ns
t_f	Turn-Off Fall Time		-	46	-	ns
Q_g	Total Gate Charge	$V_{DS} = 520V, I_D = 12A,$ $V_{GS} = 10V$	-	41.2	-	nC
Q_{gs}	Gate-Source Charge		-	10.3	-	nC
Q_{gd}	Gate-Drain Charge		-	14.4	-	nC

Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_S	Drain-Source Diode Forward Continuous Current	$V_{GS} = 0V$	-	-	12	A
I_{SM}	Maximum Pulsed Current	$V_{GS} = 0V$	-	-	48	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_S = 12A$	-	-	1.5	V

Notes:

- $T_J = +25\text{ }^\circ\text{C}$ to $+150\text{ }^\circ\text{C}$
- Repetitive rating; pulse width limited by maximum junction temperature.
- Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$
- $L = 10mH, V_{DD} = 50V, I_{as} = 8A, R_G = 25\Omega$ Starting $T_J = 25\text{ }^\circ\text{C}$

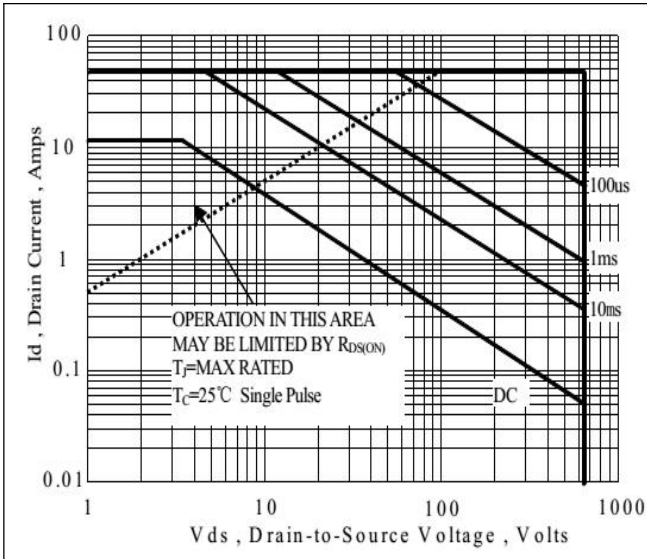


Figure 1 Maximum Safe Operating Area

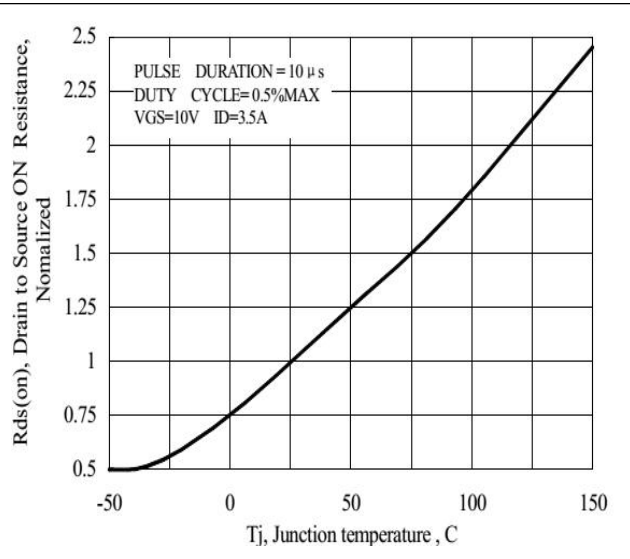


Figure 2 Normalized On-Resistance Variation with Temperature

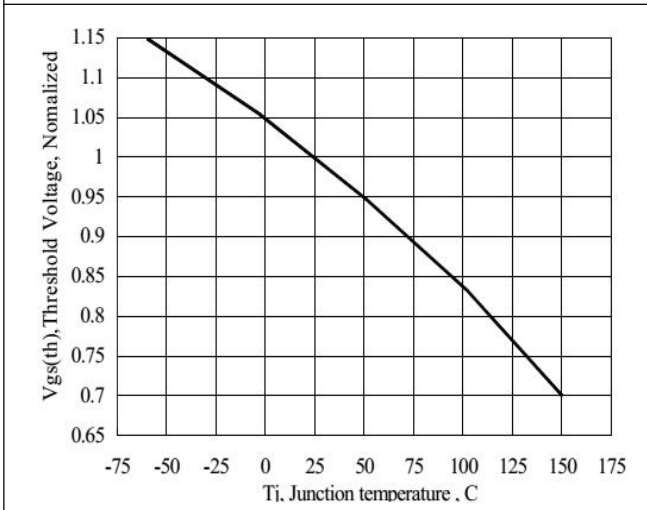


Figure 3. Gate Threshold Variation with Temperature

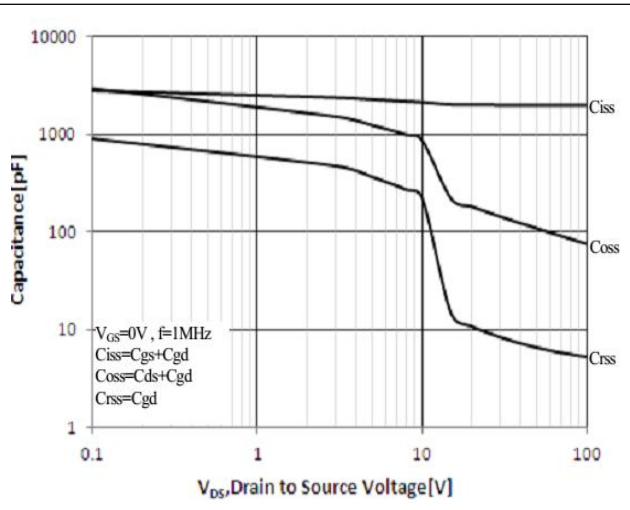


Figure 4. Capacitance Characteristics

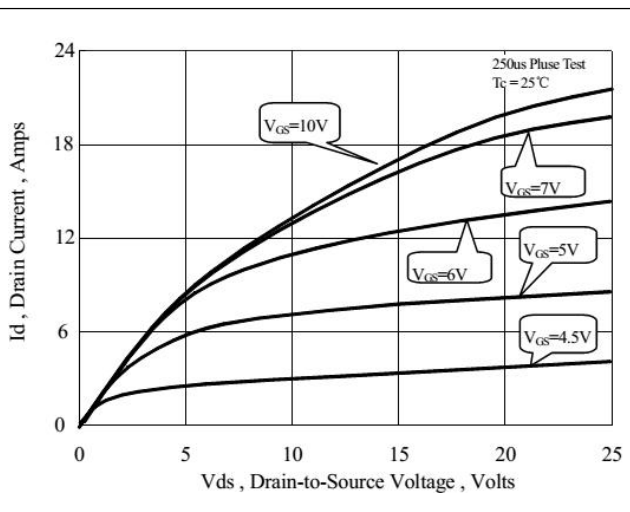
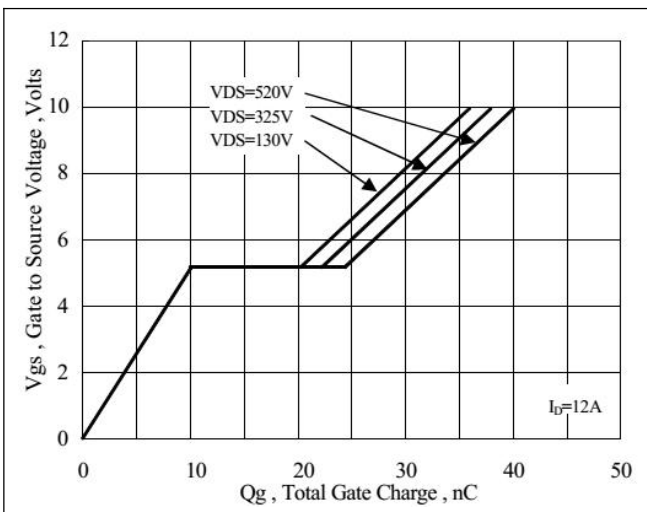


Figure 5. Gate Charge Characteristics

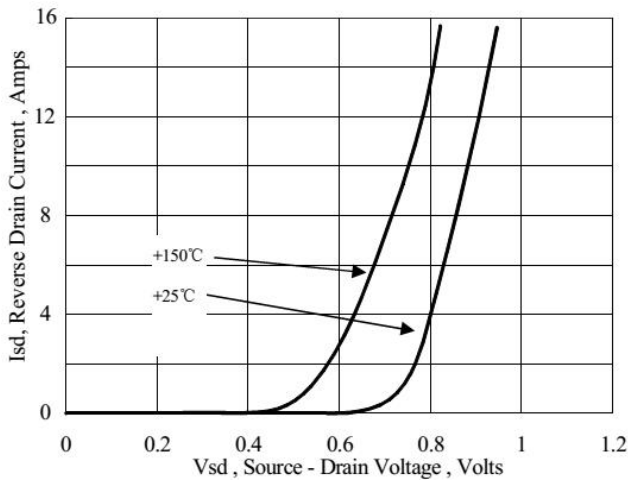


Figure 6. On-State Characteristics

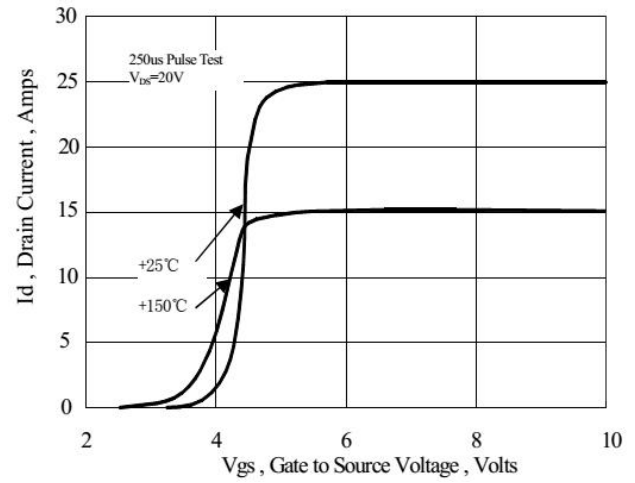


Figure 7. Body Diode Forward Voltage Variation with Source Current

Figure 8. Transfer Characteristics Variation with Source Current

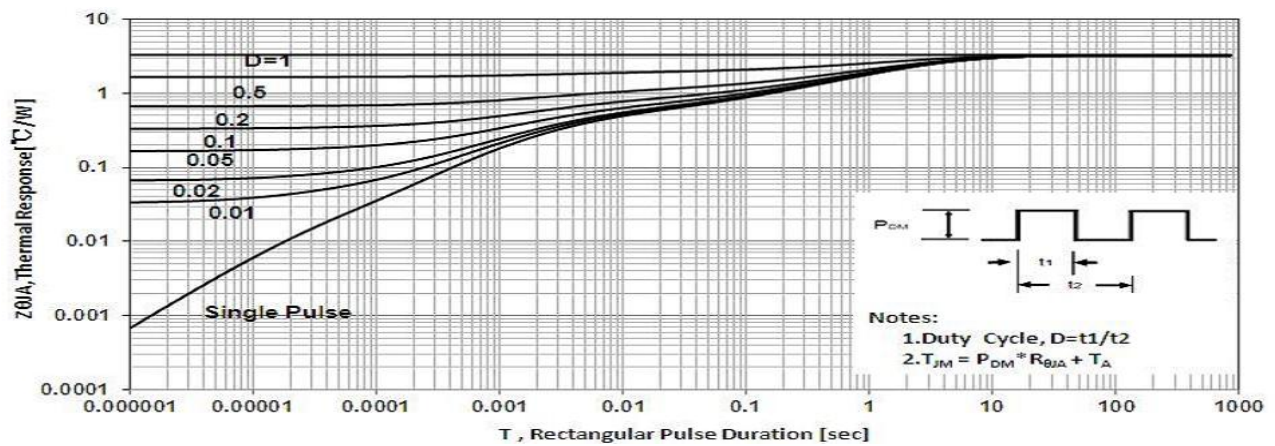


Figure 9 Normalized Effective Transient Thermal Impedance With Pulse Duration

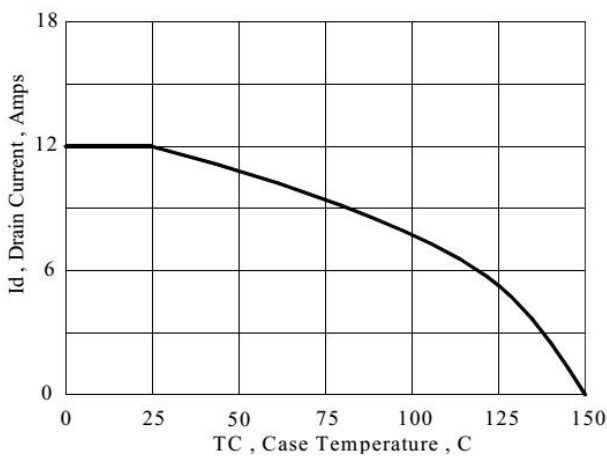


Figure 10 Maximum Drain Current with Case Temperature