

TO220F 16A, 650V N-CHANNEL POWER MOSFET

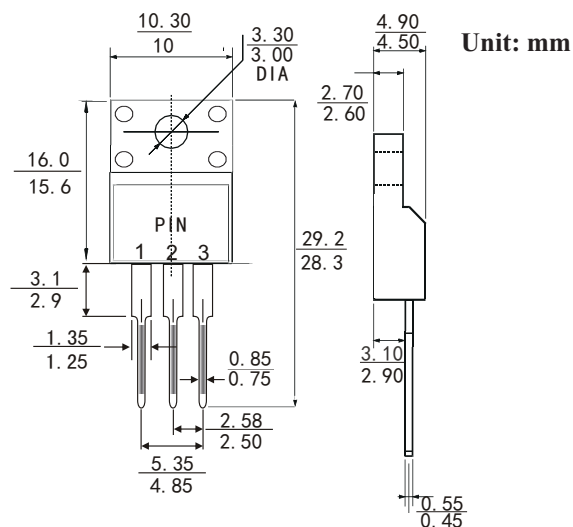
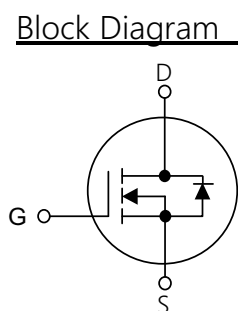
FEATURE

- 650V, 16A
 $R_{DS(ON)} < 0.62\Omega @ V_{GS} = 10V$
- Fast Switching
- Improved dv/dt Capability

SYMBOL

Pin Definition:

1. Gate
2. Drain
3. Source



Absolute Maximum Ratings (@ T_C = 25°C unless otherwise specified)

Symbol	Parameter		Value	Units
V _{DS}	Drain-to-Source Voltage		650	V
V _{GS}	Gate-to-Source Voltage		±30	V
I _D	Continuous Drain Current	T _C = 25°C	16	A
		T _C = 100°C	10	
I _{DM}	Pulsed Drain Current ⁽¹⁾		64	A
E _{AS}	Single Pulsed Avalanche Energy ⁽²⁾		845	mJ
P _D	Power Dissipation	T _C = 25°C	179	W
R _{θJA}	Thermal Resistance, Junction to Ambient ⁽³⁾		60	°C/W
R _{θJC}	Thermal Resistance, Junction to Case		0.7	
T _J , T _{STG}	Junction & Storage Temperature Range		-55 to 150	°C

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	I _D = 250μA, V _{GS} = 0V	650	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 650V, V _{GS} = 0V	-	-	1.0	μA
I _{GSS}	Gate-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	3	4	V
R _{DS(ON)}	Static Drain-Source ON-Resistance ⁽⁴⁾	V _{GS} = 10V, I _D = 8A	-	0.48	0.62	Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{GS} = 0V, V _{DS} = 25V, f = 1MHz	-	2747	-	pF
C _{oss}	Output Capacitance		-	224	-	pF
C _{rss}	Reverse Transfer Capacitance		-	27	-	pF
Q _g	Total Gate Charge	V _{GS} = 0 to 10V V _{DS} = 520V, I _D = 16A	-	62	-	nC
Q _{gs}	Gate Source Charge		-	14	-	nC
Q _{gd}	Gate Drain("Miller") Charge		-	24	-	nC
Switching Characteristics						
t _{d(on)}	Turn-On DelayTime	V _{GS} = 10V, V _{DD} = 310V I _D = 16A, R _{GEN} = 24Ω	-	38	-	ns
t _r	Turn-On Rise Time		-	52	-	ns
t _{d(off)}	Turn-Off DelayTime		-	176	-	ns
t _f	Turn-Off Fall Time		-	68	-	ns
Drain-Source Diode Characteristics and Max Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	16	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	64	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0V, I _S = 16A	-	-	1.2	V
trr	Body Diode Reverse Recovery Time	I _F = 16A, di/dt = 100A/us	-	476	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	6.9	-	μC

- Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
 2. E_{AS} condition: Starting $T_J = 25^\circ\text{C}$, $V_{DD} = 50\text{V}$, $V_G = 10\text{V}$, $R_G = 25\Omega$, $L = 10\text{mH}$, $I_{AS} = 13\text{A}$
 3. $R_{\theta JA}$ is measured with the device mounted on a minimum recommended pad of 2oz copper FR4 PCB
 4. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 0.5\%$.

Typical Performance Characteristics

Figure 1: Output Characteristics

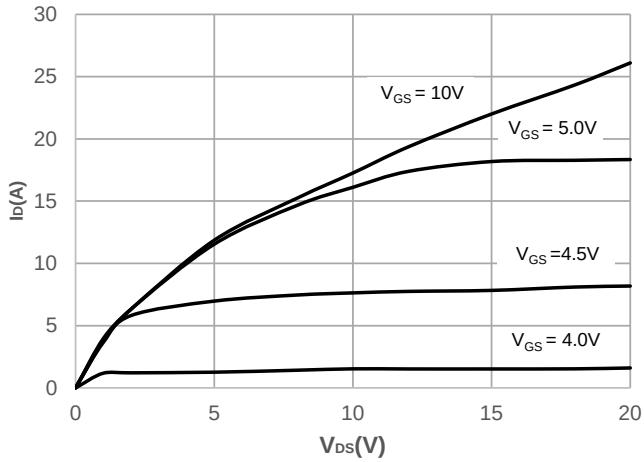


Figure 2: Typical Transfer Characteristics

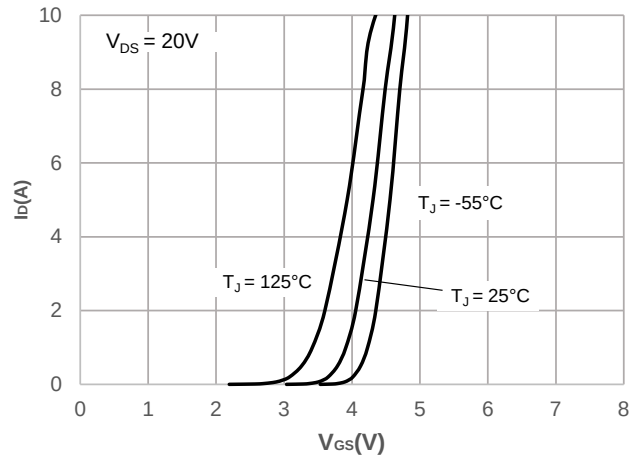


Figure 3: On-resistance vs. Drain Current

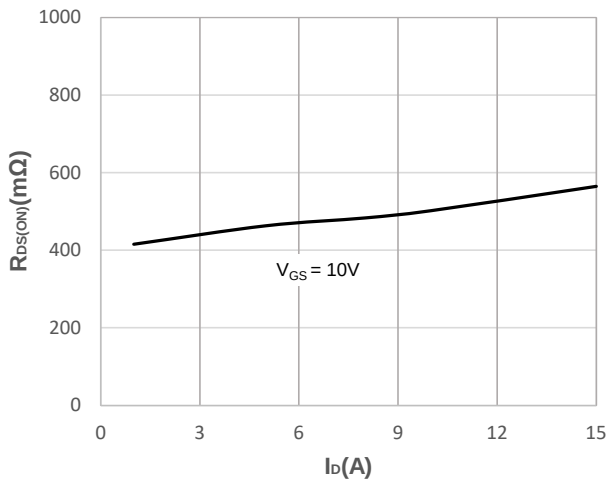


Figure 4: Body Diode Characteristics

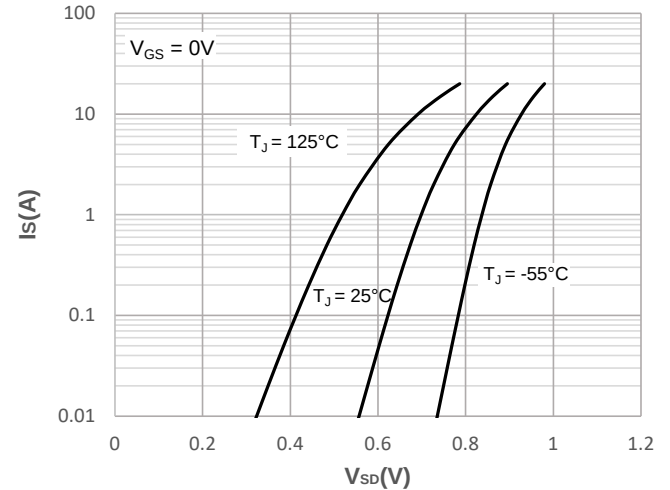


Figure 5: Gate Charge Characteristics

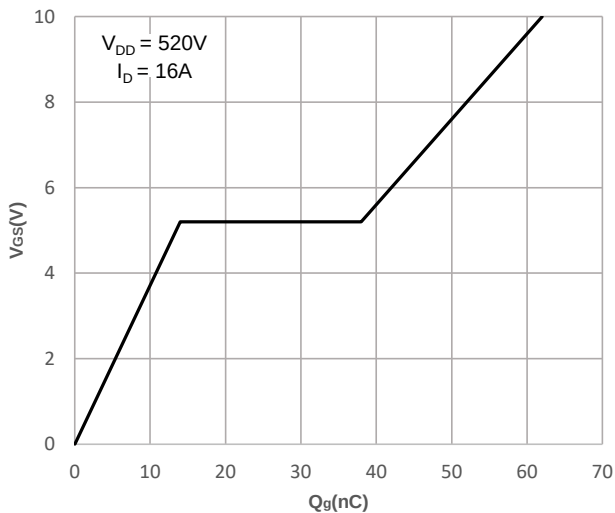
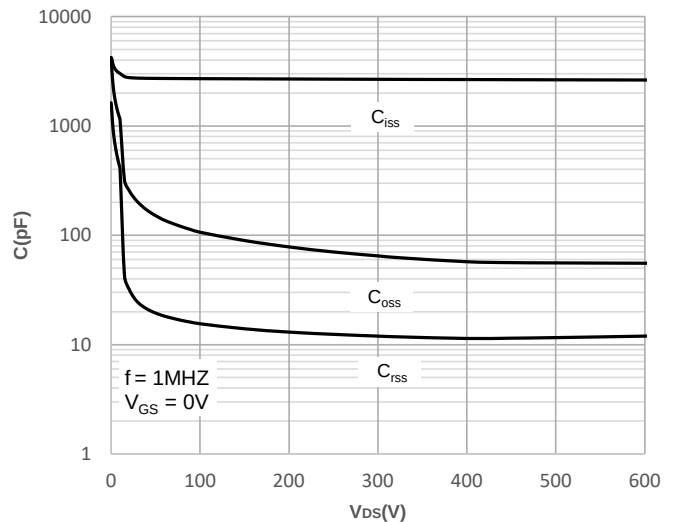


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown voltage vs. Junction Temperature

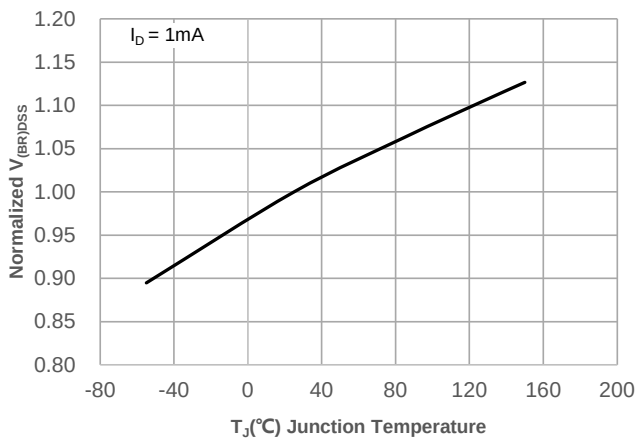


Figure 8: Normalized on Resistance vs. Junction Temperature

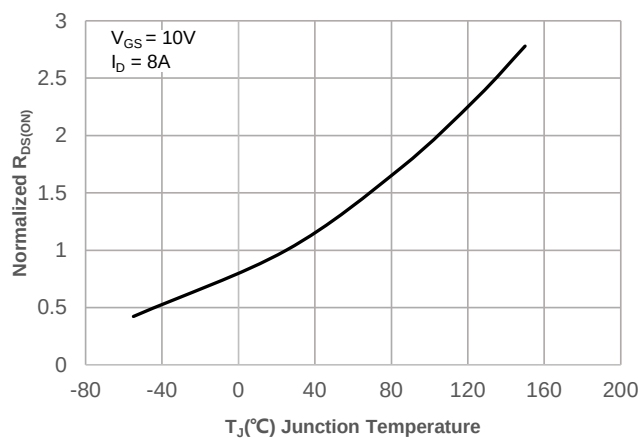


Figure 9: Maximum Safe Operating Area

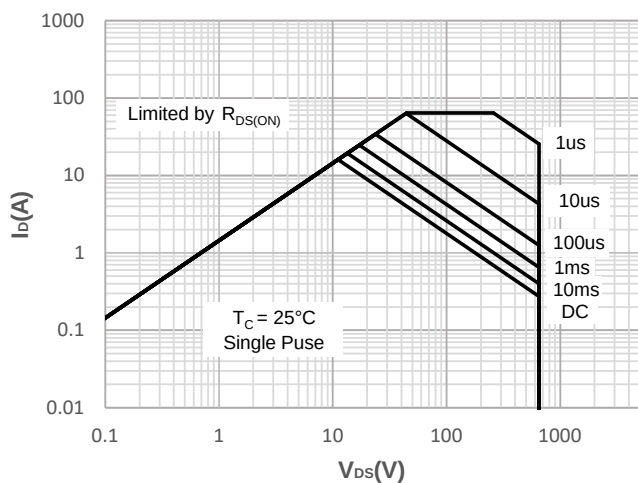


Figure 10: Maximum Continuous Driant Current vs. Case Temperature

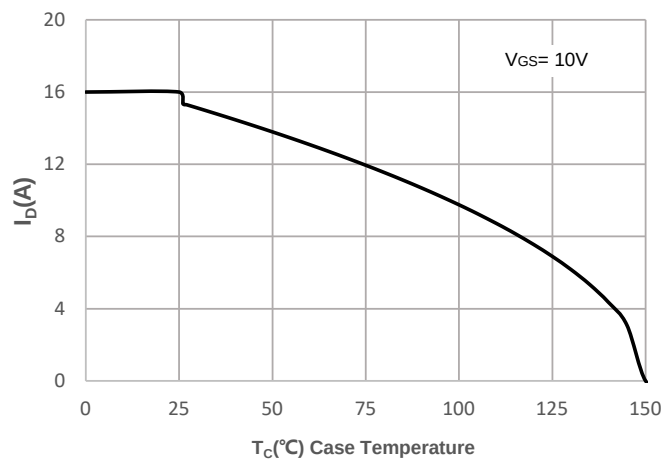


Figure 11: Normalized Maximum Transient Thermal Impedance

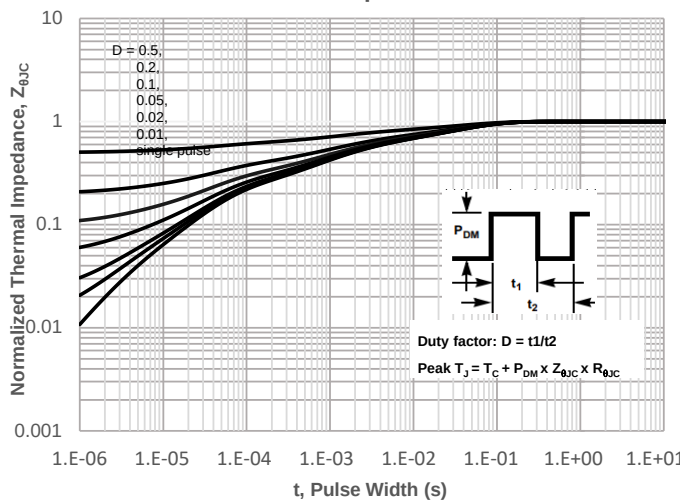


Figure 12: Peak Current Capacity

