

**Product Summary**

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D$
650V	0.46Ω@10V	16A

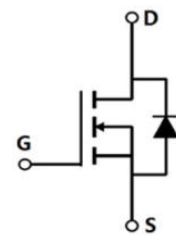
**Feature**

- Low  $R_{DS(on)}$
- Low FOM
- Extremely low switching loss
- Good stability and uniformity

**Application**

- Consumer electronics power supply
- LED Lighting
- Standby Power
- Charger

**TO-220F**

**Schematic diagram**

**MARKING:**

**ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$  unless otherwise noted)**

Parameter	Symbol	Value	Unit
Drain - Source Voltage	$V_{DS}$	650	V
Gate - Source Voltage	$V_{GS}$	±30	V
Continuous Drain Current <sup>1,6</sup>	$I_D$	$T_C = 25^\circ\text{C}$	16
		$T_C = 100^\circ\text{C}$	10
Pulsed Drain Current <sup>2</sup>	$I_{DM}$	64	A
Single Pulsed Avalanche Current <sup>3</sup>	$I_{AS}$	40.5	A
Single Pulsed Avalanche Energy <sup>3</sup>	$E_{AS}$	410	mJ
Power Dissipation <sup>5,6</sup>	$P_D$	38	W
Thermal Resistance from Junction to Case <sup>6</sup>	$R_{\theta JC}$	3.3	$^\circ\text{C}/\text{W}$
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55~ +150	$^\circ\text{C}$

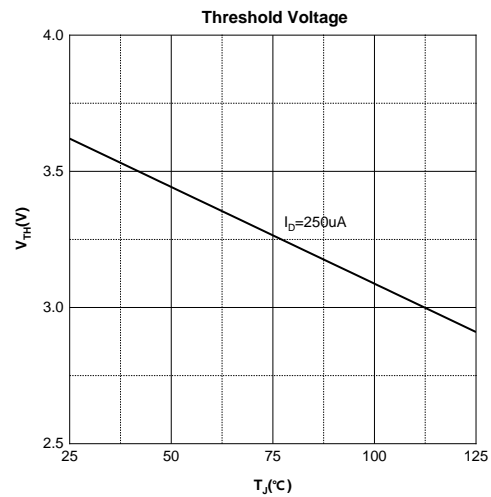
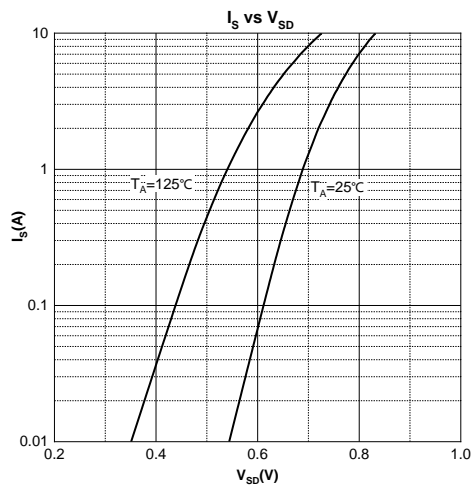
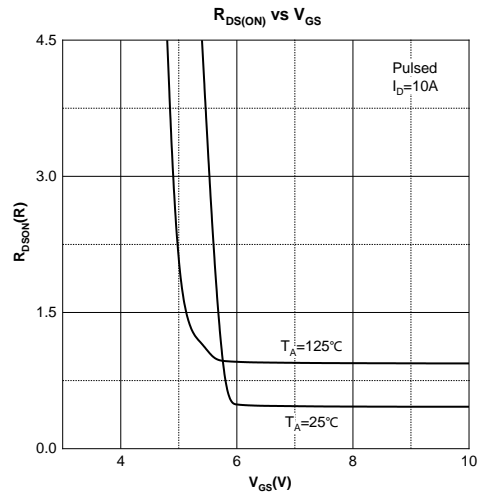
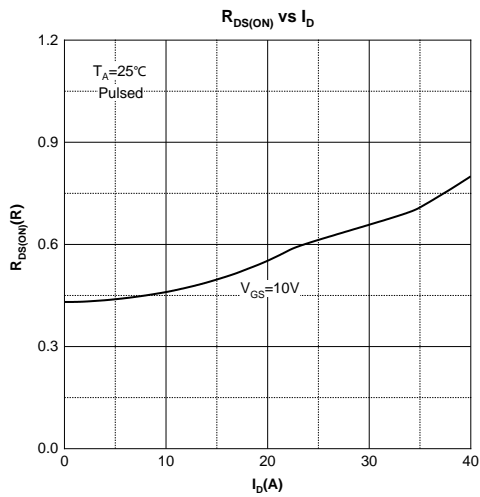
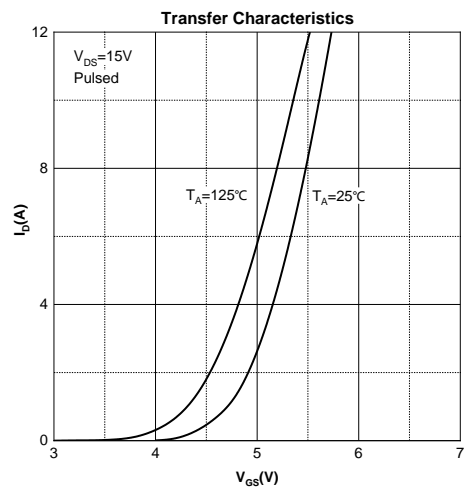
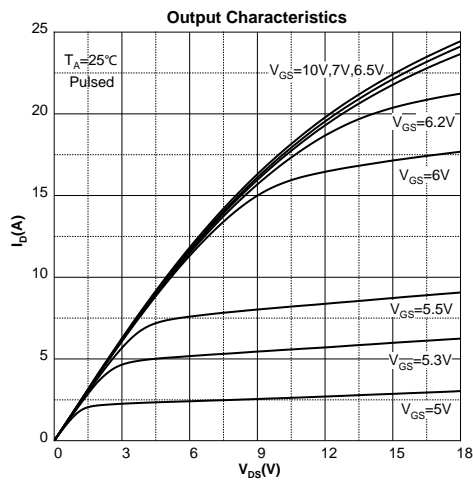
## ELECTRICAL CHARACTERISTICS (T<sub>A</sub>=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
<b>Off Characteristics</b>						
Drain - Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	650			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 650V, V <sub>GS</sub> = 0V			1	μA
Gate - Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±30V, V <sub>DS</sub> = 0V			±100	nA
<b>On Characteristics<sup>4</sup></b>						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	2.5	3.6	4.5	V
Drain-source On-resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 10A		0.46	0.6	Ω
<b>Dynamic Characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 325V, V <sub>GS</sub> = 0V, f = 1MHz		1855		pF
Output Capacitance	C <sub>oss</sub>			65		
Reverse Transfer Capacitance	C <sub>rss</sub>			7		
Gate Resistance	R <sub>g</sub>	V <sub>DS</sub> = 0V, V <sub>GS</sub> = 0V, f = 1MHz		2.2		Ω
<b>Switching Characteristics</b>						
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 325V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 10A		40		nC
Gate-source Charge	Q <sub>gs</sub>			11		
Gate-drain Charge	Q <sub>gd</sub>			16		
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> = 400V, V <sub>GS</sub> = 10V, I <sub>D</sub> = 8A, R <sub>G</sub> = 2Ω		31		ns
Turn-on Rise Time	t <sub>r</sub>			10		
Turn-off Delay Time	t <sub>d(off)</sub>			39		
Turn-off Fall Time	t <sub>f</sub>			6		
<b>Source - Drain Diode Characteristics</b>						
Diode Forward Voltage <sup>4</sup>	V <sub>SD</sub>	V <sub>GS</sub> = 0V, I <sub>S</sub> = 10A			1.2	V

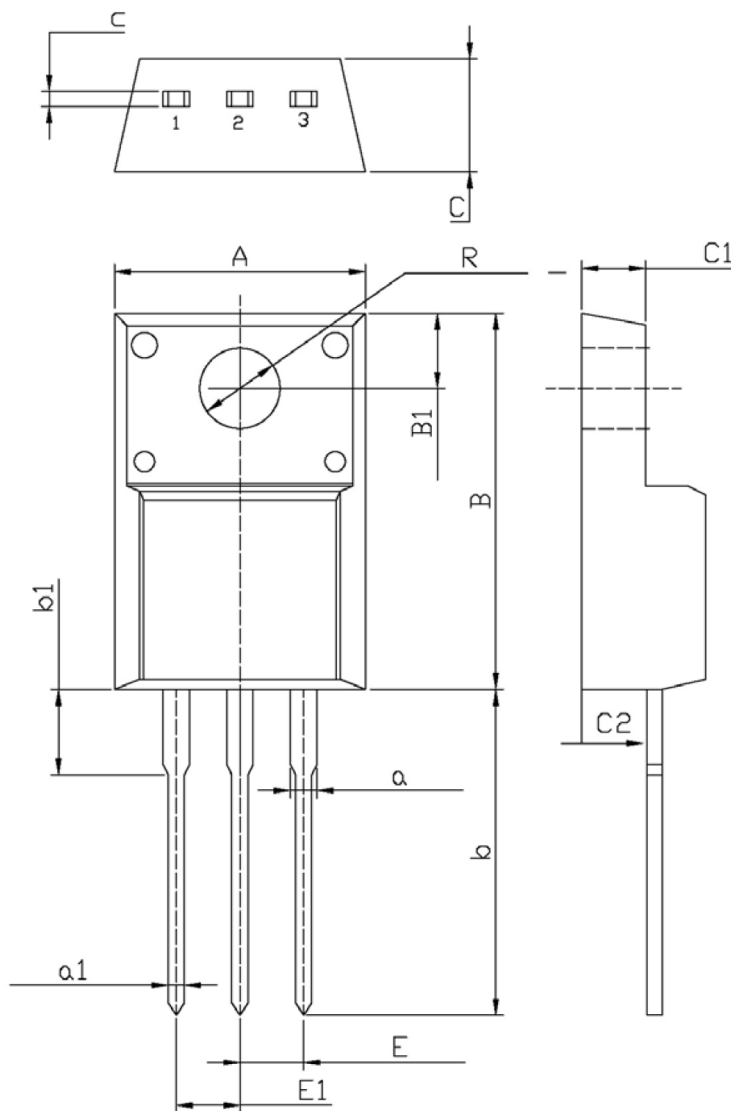
### Notes :

- 1.The maximum current rating is limited by package.
- 2.Pulse Test : Pulse Width ≤ 10μs, duty cycle ≤ 1%.
- 3.EAS condition: V<sub>DD</sub> = 100V, V<sub>GS</sub> = 10V, L = 0.5mH, R<sub>G</sub> = 25Ω Starting T<sub>J</sub> = 25°C.
- 4.Pulse Test : Pulse Width ≤ 300μs, duty cycle ≤ 2%.
- 5.The power dissipation P<sub>D</sub> is limited by T<sub>J(MAX)</sub> = 150°C.
- 6.Device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with T<sub>A</sub> =25°C.

## Typical Characteristics



## TO-220F-3L Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
C	4.500	4.900	0.177	0.193
c	0.400	0.600	0.016	0.024
A	9.960	10.360	0.392	0.408
B	15.670	16.070	0.617	0.633
B1	3.300	3.500	0.130	0.138
R	3.080	3.280	0.121	0.129
b	12.480	13.480	0.491	0.531
b1	2.900	3.900	0.114	0.154
a	1.080	1.480	0.043	0.058
a1	0.700	0.900	0.028	0.035
E	2.340	2.740	0.092	0.108
E1	2.340	2.740	0.092	0.108
C1	2.340	2.740	0.092	0.108
C2	2.560	2.960	0.101	0.117