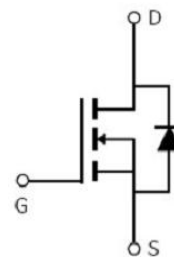


## Main Product Characteristics:

$V_{DS}$	600V
$R_{DS(on)}$	1.1 $\Omega$ (typ.)
$I_D$	7 A <sup>①</sup>



TO-220F



Schematic diagram

## Features and Benefits:

- Advanced Process Technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 150°C operating temperature



## Description:

It utilizes the latest processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

## Absolute Max Rating:

Symbol	Parameter	Max.	Units
$I_D @ T_c = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$ <sup>①</sup>	7	A
$I_{DM}$	Pulsed Drain Current <sup>②</sup>	28	
$P_D @ T_c = 25^\circ\text{C}$	Power Dissipation <sup>③</sup>	63	W
$V_{DS}$	Drain-Source Voltage	600	V
$V_{GS}$	Gate-to-Source Voltage	$\pm 30$	V
$E_{AS}$	Single Pulse Avalanche Energy @ $L=0.3\text{mH}$	198	mJ
$T_J \quad T_{STG}$	Operating Junction and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

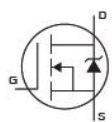
## Thermal Resistance

Symbol	Characterizes	Typ.	Max.	Units
R <sub>θJC</sub>	Junction-to-case ③	—	1.29	°C/W
R <sub>θJA</sub>	Junction-to-ambient (t ≤ 10s) ④	—	62.5	

## Electrical Characterizes @T<sub>A</sub>=25°C unless otherwise specified

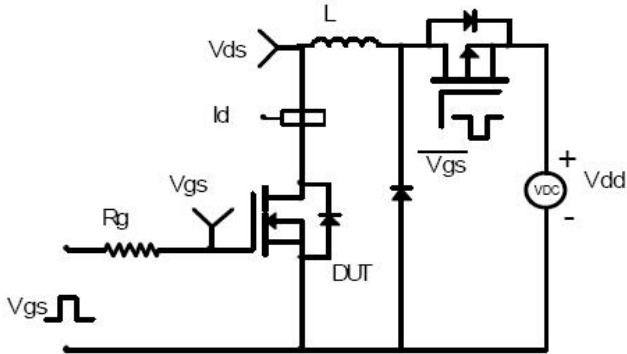
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>(BR)DSS</sub>	Drain-to-Source breakdown voltage	600	—	—	V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA
R <sub>DS(on)</sub>	Static Drain-to-Source on-resistance	—	1.1	1.35	Ω	V <sub>GS</sub> =10V, I <sub>D</sub> = 3.2A
V <sub>GS(th)</sub>	Gate threshold voltage	2.0	—	4.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
I <sub>DSS</sub>	Drain-to-Source leakage current	—	—	1	μA	V <sub>DS</sub> = 600V, V <sub>GS</sub> = 0V
I <sub>GSS</sub>	Gate-to-Source forward leakage	—	—	100	nA	V <sub>GS</sub> = 30V, V <sub>DS</sub> = 0V
		—	—	-100		V <sub>GS</sub> = -30V, V <sub>DS</sub> = 0V
Q <sub>g</sub>	Total gate charge	—	22	—	nC	I <sub>D</sub> = 7A, V <sub>DS</sub> =520V V <sub>GS</sub> = 10V
Q <sub>gs</sub>	Gate-to-Source charge	—	4.3	—		
Q <sub>gd</sub>	Gate-to-Drain("Miller") charge	—	9	—		
t <sub>d(on)</sub>	Turn-on delay time	—	15	—	ns	V <sub>GS</sub> =10V, V <sub>DS</sub> =325V, R <sub>GEN</sub> =25Ω I <sub>D</sub> = 7A
t <sub>r</sub>	Rise time	—	18	—		
t <sub>d(off)</sub>	Turn-Off delay time	—	80	—		
t <sub>f</sub>	Fall time	—	35	—		
C <sub>iss</sub>	Input capacitance	—	891	—	pF	V <sub>GS</sub> = 0V V <sub>DS</sub> = 100V f = 1MHz
C <sub>oss</sub>	Output capacitance	—	110	—		
C <sub>rss</sub>	Reverse transfer capacitance	—	14	—		

## Source-Drain Ratings and Characteristics

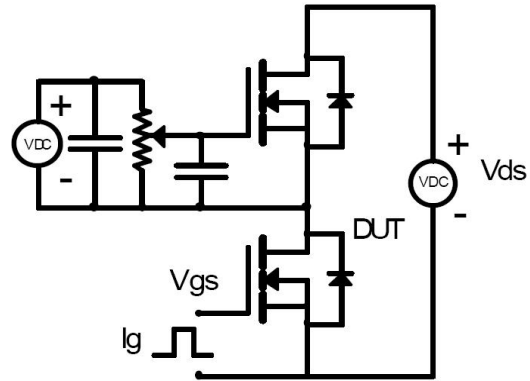
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	Continuous Source Current (Body Diode)	—	—	7.0	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I <sub>SM</sub>	Pulsed Source Current (Body Diode)	—	—	28	A	
V <sub>SD</sub>	Diode Forward Voltage	—	—	1.4	V	I <sub>S</sub> =7A, V <sub>GS</sub> =0V
t <sub>rr</sub>	Reverse Recovery Time	—	300	—	nS	I <sub>F</sub> =7A, V <sub>GS</sub> =0V
Q <sub>rr</sub>	Reverse Recovery Charge	—	4.1	—	uC	di/dt = 100A/μs

## Test Circuits and Waveforms

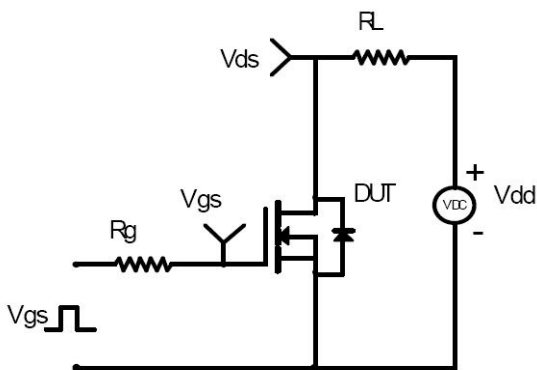
EAS Test Circuit:



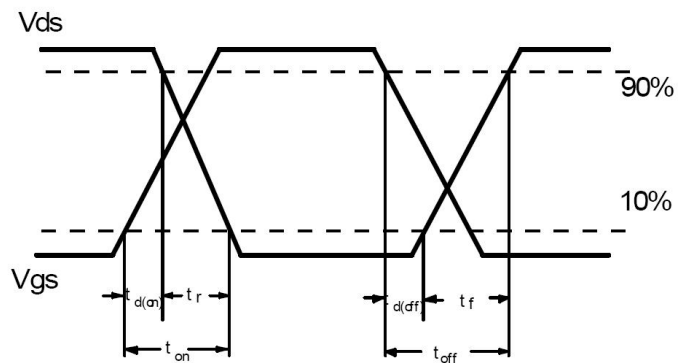
Gate Charge Test Circuit:



Switching Time Test Circuit:



Switching Waveforms:



## Notes:

- ① Calculated continuous current based on maximum allowable junction temperature.
- ② Repetitive rating; pulse width limited by max. junction temperature.
- ③ The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.
- ④ The value of  $R_{\theta JA}$  is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^\circ\text{C}$

## Typical Electrical and Thermal Characteristics

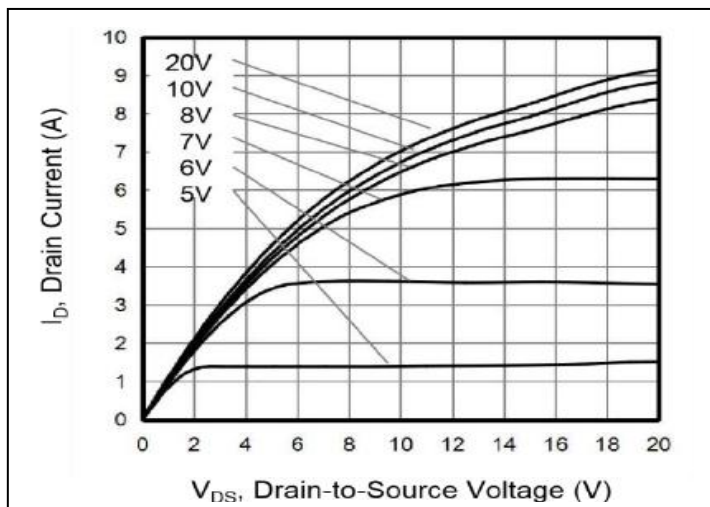


Figure1. Typical Output Characteristics

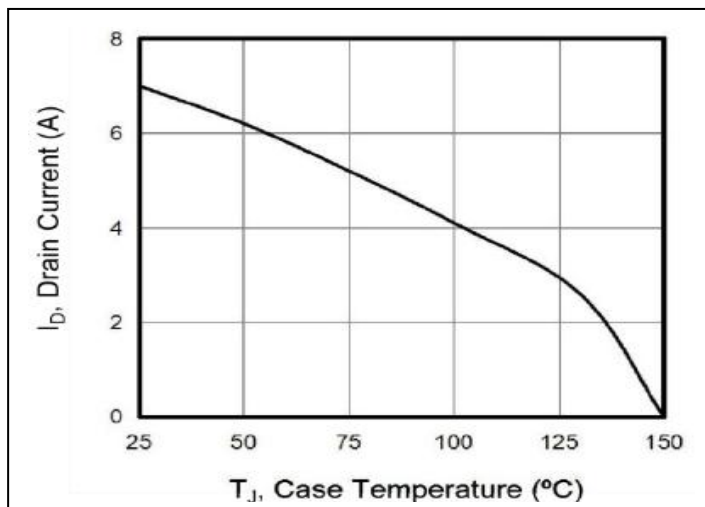


Figure2. Drain Current vs. Temperature

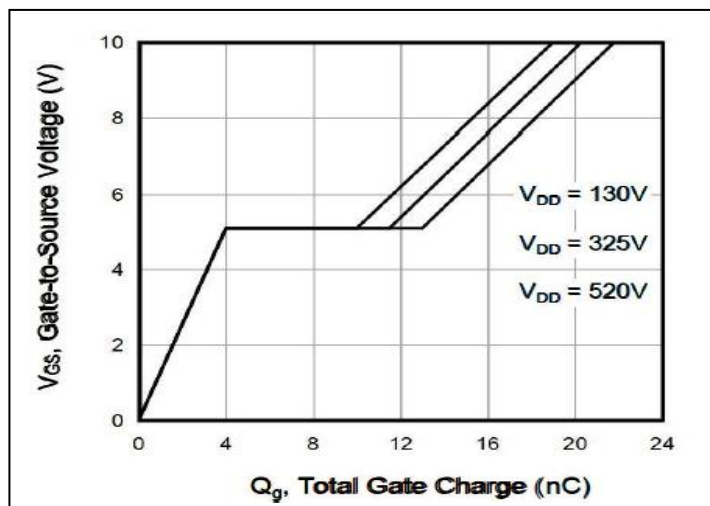


Figure3. Gate Charge

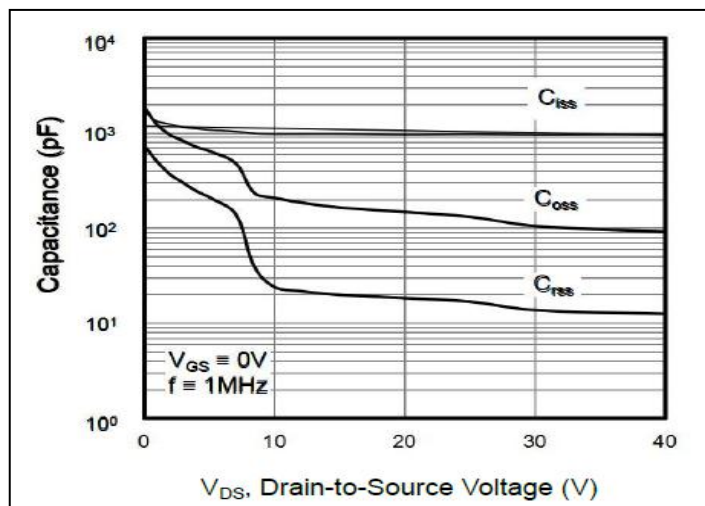


Figure4. Capacitance

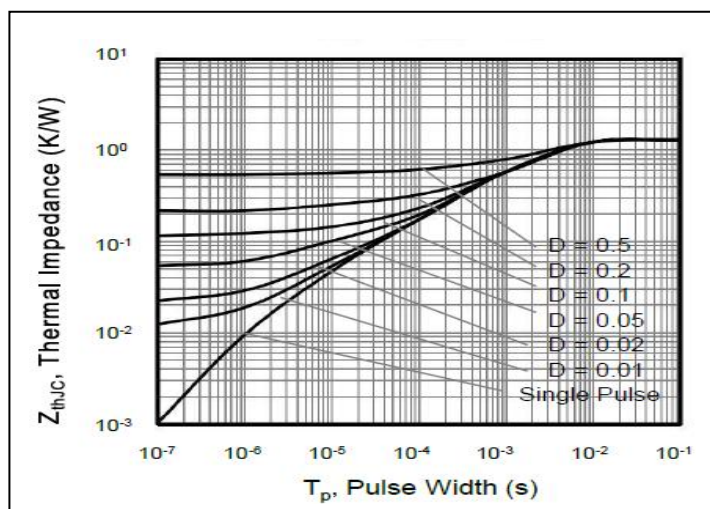


Figure5. Transient Thermal Impedance

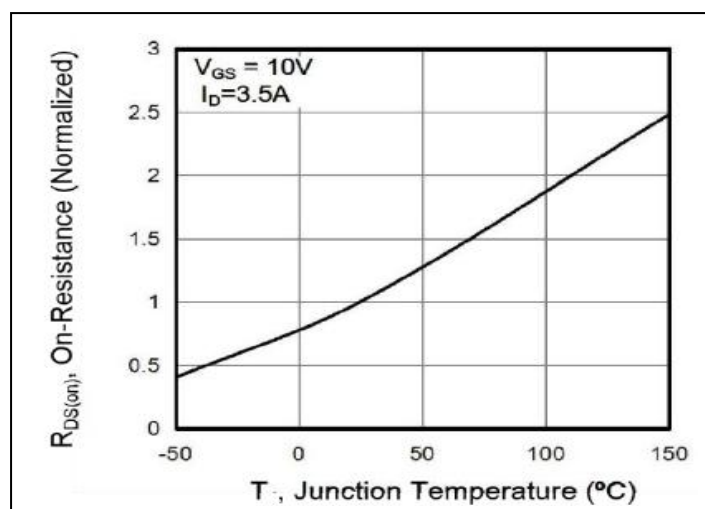
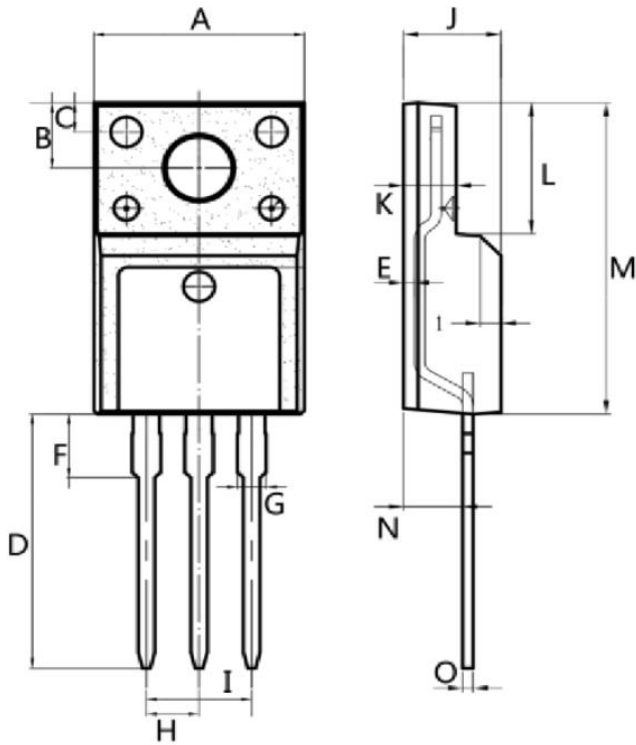


Figure6. Typ. Drain-source on-state Resistance

## Mechanical Data:

TO-220F Package Outline(Unit:mm)



Dim.	Min.	Max.
A	9.9	10.3
B	2.9	3.5
C	1.15	1.45
D	12.75	13.25
E	0.55	0.75
F	3.1	3.5
G	1.25	1.45
H	Typ 2.54	
I	Typ 5.08	
J	4.55	4.75
K	2.4	2.7
L	6.35	6.75
M	15.0	16.0
N	2.75	3.15
O	0.45	0.60
All Dimensions in millimeter		

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