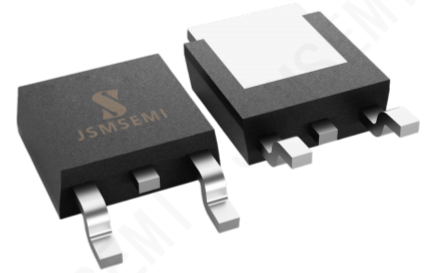


## Product Summary

- $V_{DS}$  60V
- $I_D$  110A
- $R_{DS(ON)}$  (at  $V_{GS}=10V$ )  $<4.8m\Omega$
- 100% EAS Tested
- 100%  $\nabla V_{DS}$  Tested

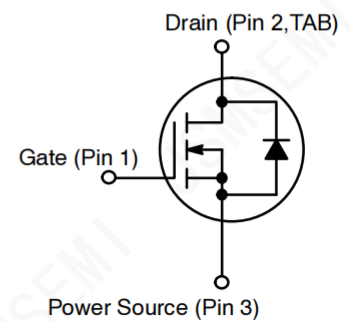


## General Description

- Trench Power MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low  $R_{DS(ON)}$
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free

## Applications

- Power switching application
- Uninterruptible power supply
- DC-DC convertor
- Motor drivers



### ■ Absolute Maximum Ratings ( $T_A=25^\circ C$ unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-source Voltage		$V_{DS}$	60	V
Gate-source Voltage		$V_{GS}$	$\pm 20$	V
Drain Current	$T_C=25^\circ C$	$I_D$	110	A
	$T_C=100^\circ C$		78	
Pulsed Drain Current <sup>A</sup>		$I_{DM}$	440	A
Avalanche energy <sup>B</sup>		EAS	221	mJ
Total Power Dissipation <sup>C</sup>	$T_C=25^\circ C$	$P_D$	78	W
	$T_C=100^\circ C$		51	
Junction and Storage Temperature Range		$T_J, T_{STG}$	-55~+150	$^\circ C$

### ■ Thermal resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient <sup>D</sup>	Steady-State	$R_{\theta JA}$	55		$^\circ C/W$
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	1.6		

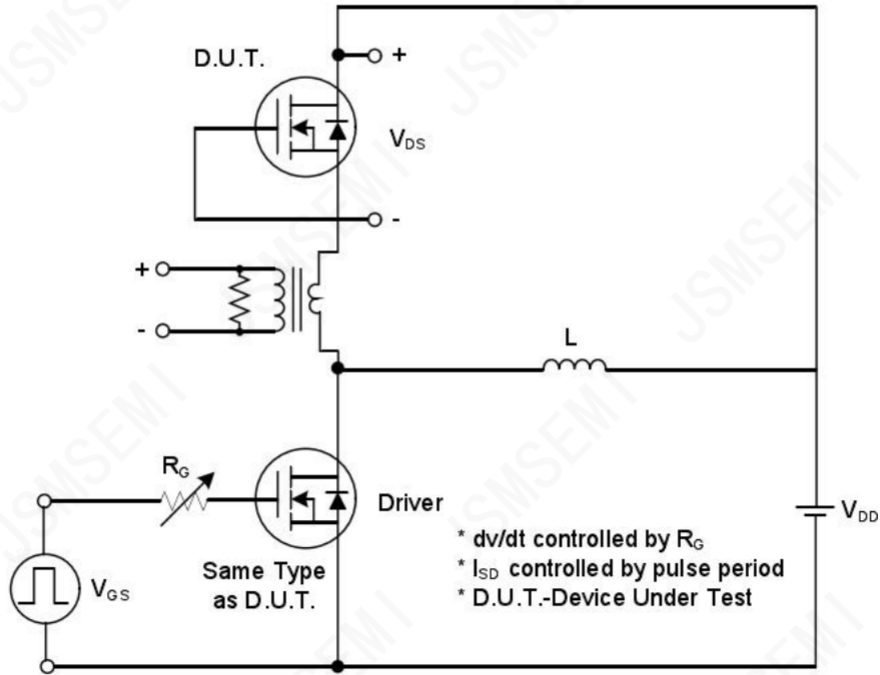
## Ordering Information

Order number	Package	Marking	Operation Temperature Range	MSL Grade	Ship, Quantity	Green
IRFR7540TRPBF-JSM	TO-252	FR7540	-55 to 150 $^\circ C$	1	T&R,2500	RoHS

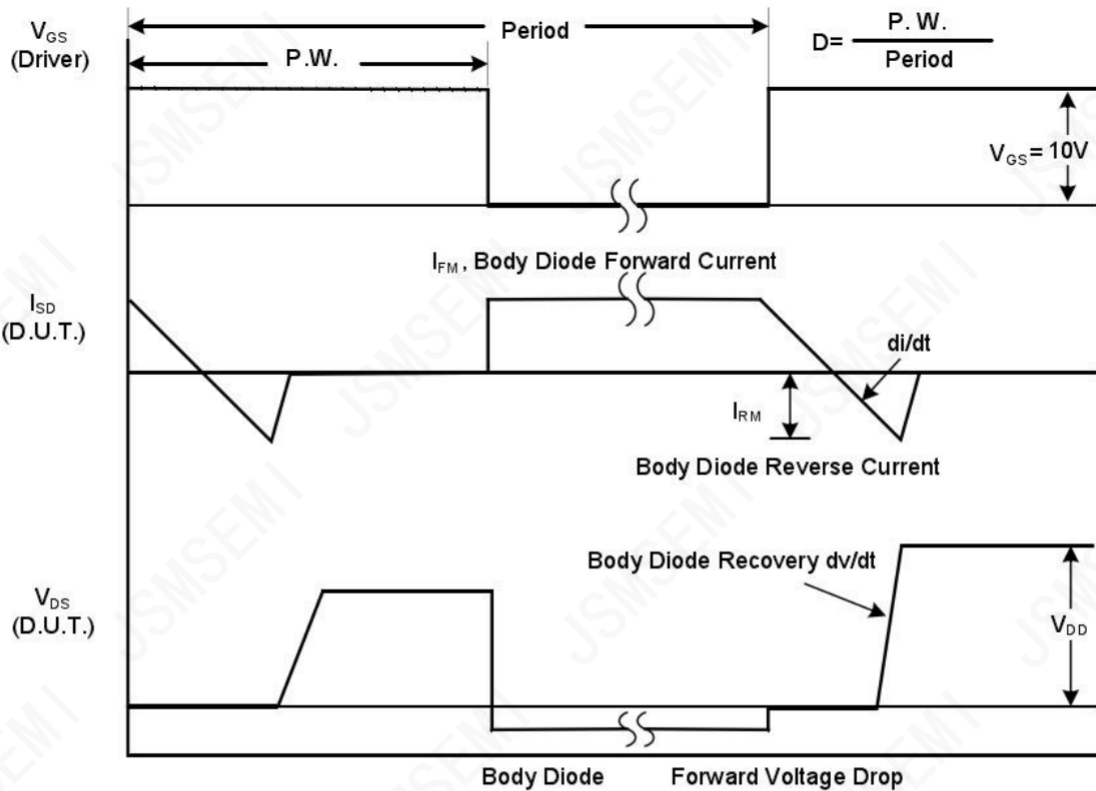
**■ Electrical Characteristics** ( $T_J=25^{\circ}\text{C}$  unless otherwise noted)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
<b>Static Characteristic</b>						
Drain-source breakdown voltage	$BV_{DSS}$	60	-	-	V	$V_{GS}=0V, I_D=250\mu A$
Gate threshold voltage	$V_{GS(th)}$	1.2	-	2.5	V	$V_{DS}=V_{GS}, I_D=250\mu A$
Zero gate voltage drain current	$I_{DSS}$	-	0.02	1	$\mu A$	$V_{DS}=60V, V_{GS}=0V$ $T_J=25^{\circ}\text{C}$ $T_J=150^{\circ}\text{C}$
Gate-source leakage current	$I_{GSS}$	-	$\pm 10$	$\pm 100$	nA	$V_{GS}=\pm 20V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	4.0	4.8	$m\Omega$	$V_{GS}=10V, I_D=20A$
		-	4.8	6.5	$m\Omega$	$V_{GS}=4.5V, I_D=20A$
<b>Dynamic Characteristic</b>						
Input Capacitance	$C_{iss}$	-	2240	-	pF	$V_{GS}=0V,$ $V_{DS}=25V,$ $f=300\text{KHz}$
Output Capacitance	$C_{oss}$	-	850	-		
Reverse Transfer Capacitance	$C_{rss}$	-	20	-		
Gate Total Charge	$Q_G$	-	33	-	nC	$V_{DS}=30V, I_D=20A,$ $V_{GS}=10V$
Gate-Source charge	$Q_{gs}$	-	4.5	-		
Gate-Drain charge	$Q_{gd}$	-	5	-		
Turn-on delay time	$t_{d(on)}$	-	6.5	-	ns	$V_{GS}=10V,$ $V_{DD}=30V,$ $R_{G\_ext}=5\Omega, I_D=20A$
Rise time	$t_r$	-	8	-		
Turn-off delay time	$t_{d(off)}$	-	38	-		
Fall time	$t_f$	-	16	-		
<b>Body Diode Characteristic</b>						
Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	$V_{SD}$	-	0.77	1.2	V	$V_{GS}=0V, I_{SD}=30A$
Body Diode Continuous Forward Current	$I_S$	-	-	110	A	$TC = 25^{\circ}\text{C}$
Body Diode Pulsed Current	$I_S$ pulse	-	-	260	A	$TC = 25^{\circ}\text{C}$
Body Diode Reverse Recovery Time	$t_{rr}$	-	39	-	ns	$I_F=1A,$ $diF/dt=100A/\mu s$
Body Diode Reverse Recovery Charge	$Q_{rr}$	-	45	-	nC	

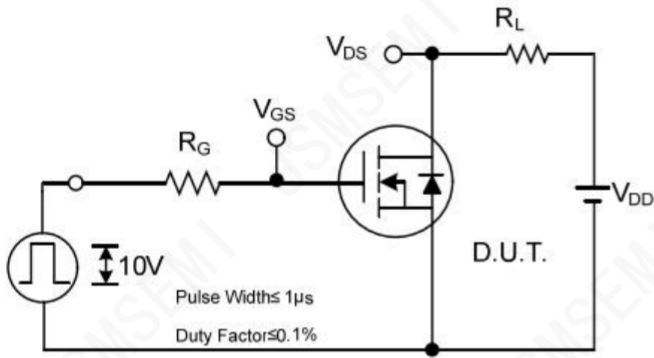
■ RATING AND CHARACTERISTIC CURVES



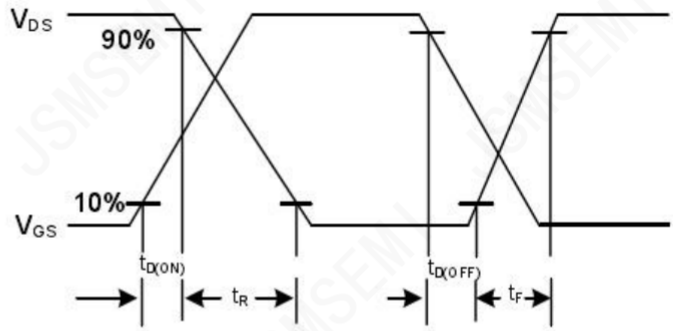
Peak Diode Recovery  $dv/dt$  Test Circuit



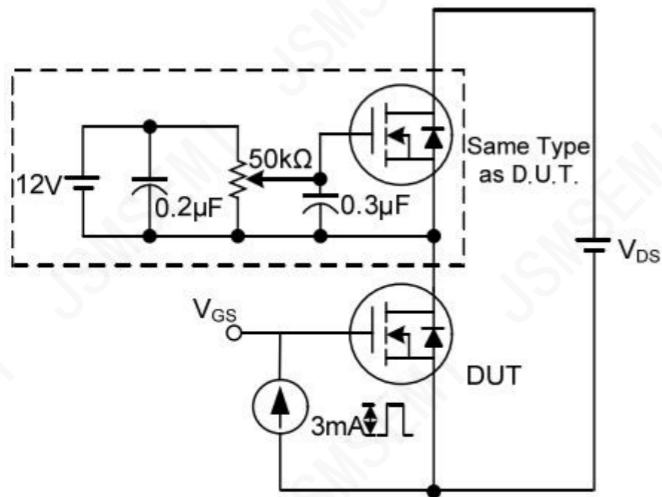
Peak Diode Recovery  $dv/dt$  Waveforms



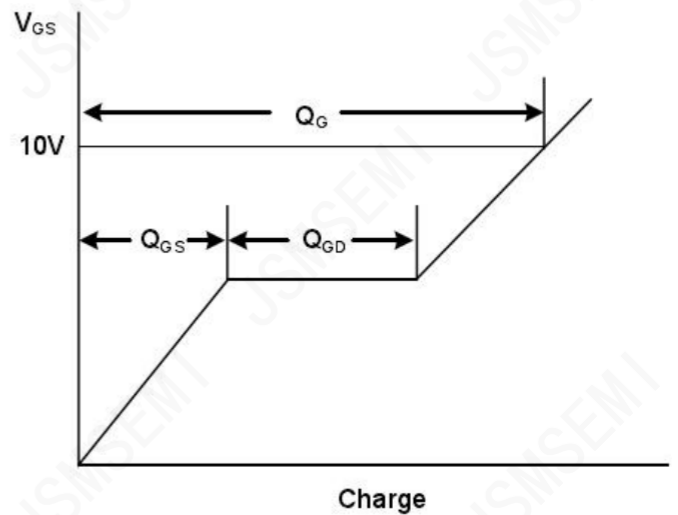
Switching Test Circuit



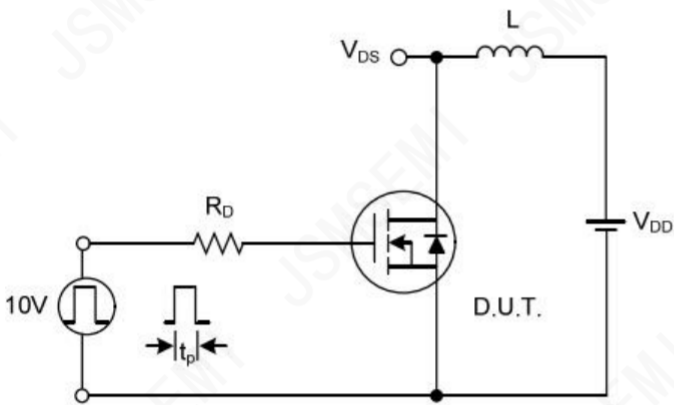
Switching Waveforms



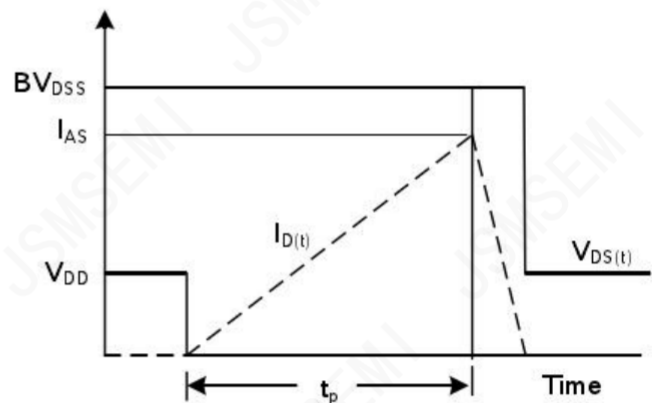
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

■ Typical Electrical and Thermal Characteristics Diagrams

Figure 1: Output Characteristics

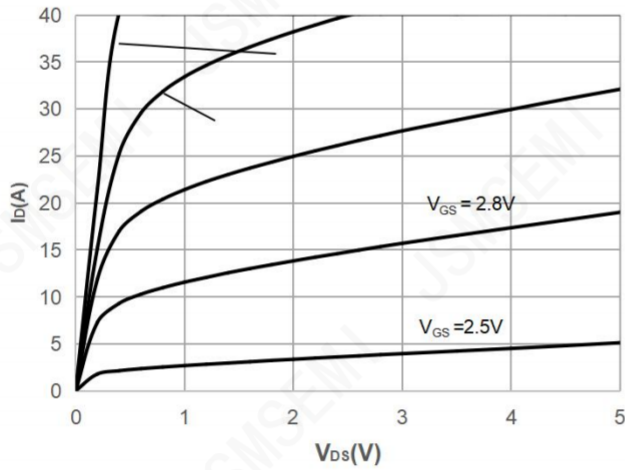


Figure 2: Typical Transfer Characteristics

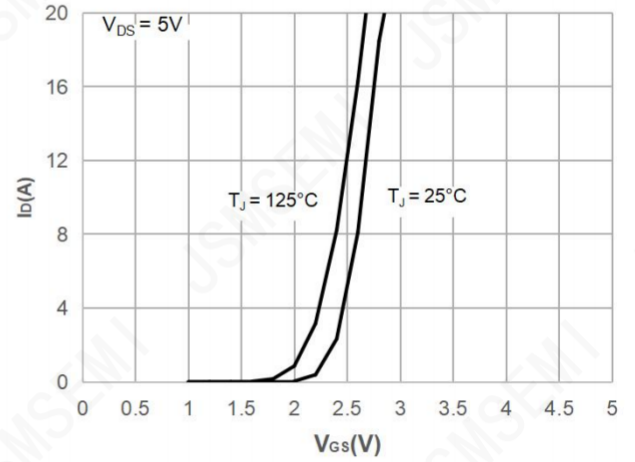


Figure 3: On-resistance vs. Drain Current

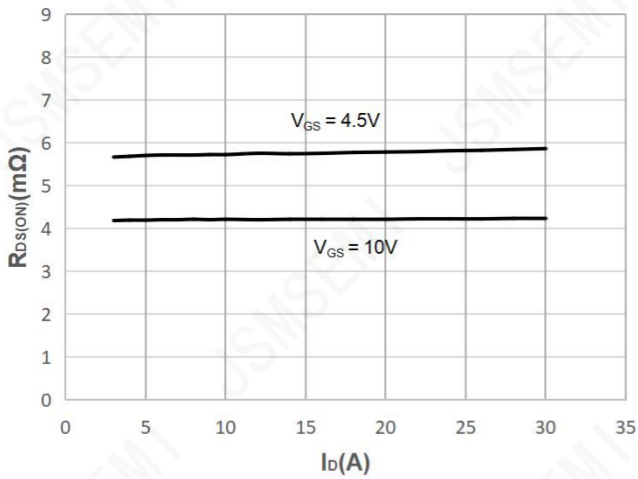


Figure 4: Body Diode Characteristics

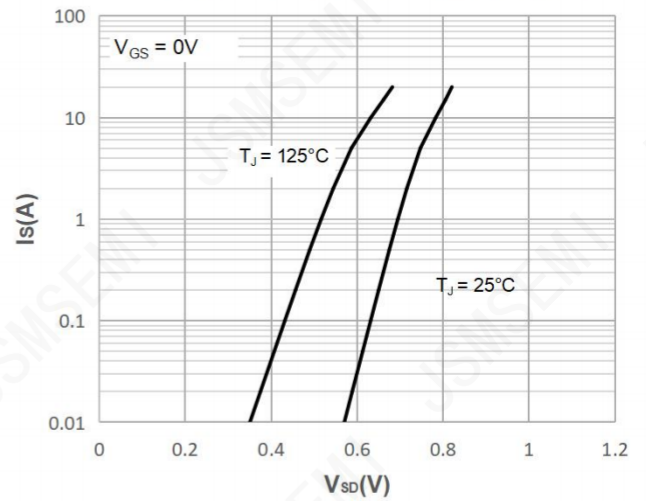


Figure 5: Gate Charge Characteristics

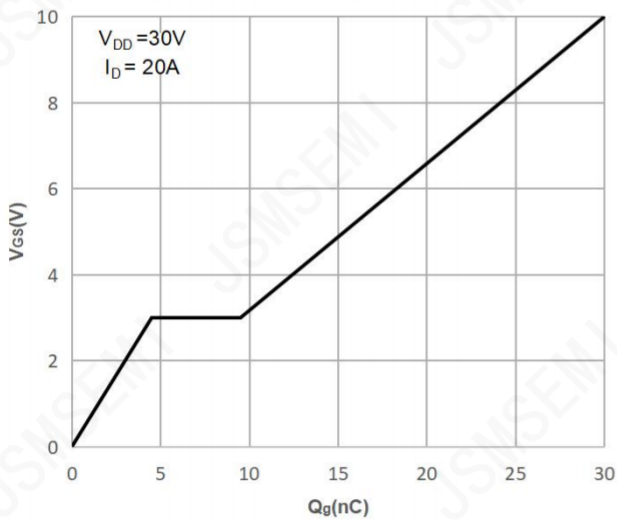


Figure 6: Capacitance Characteristics

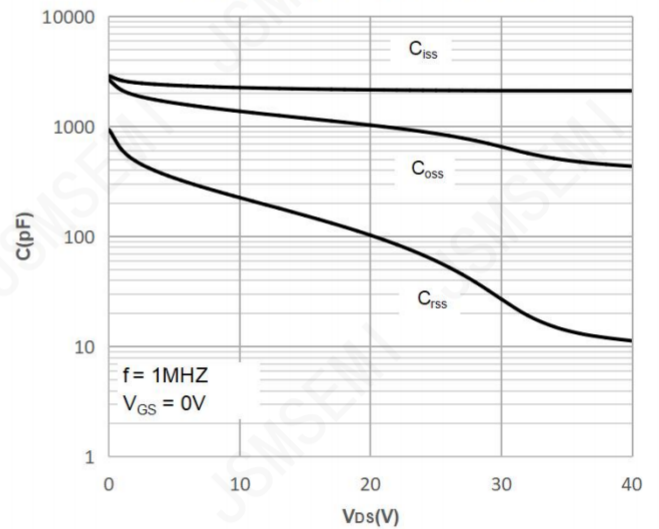


Figure 7: Normalized Breakdown voltage vs. Junction Temperature

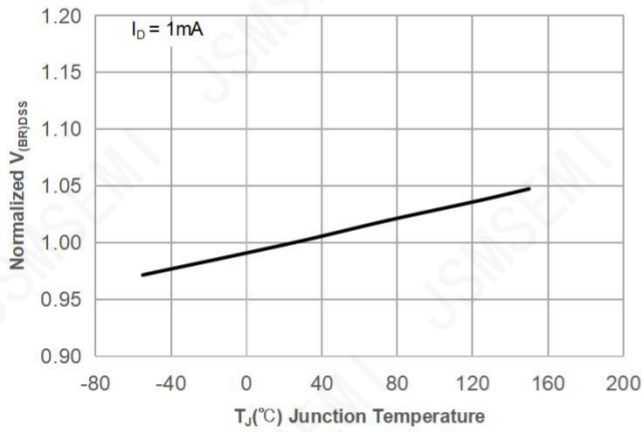


Figure 8: Normalized on Resistance vs. Junction Temperature

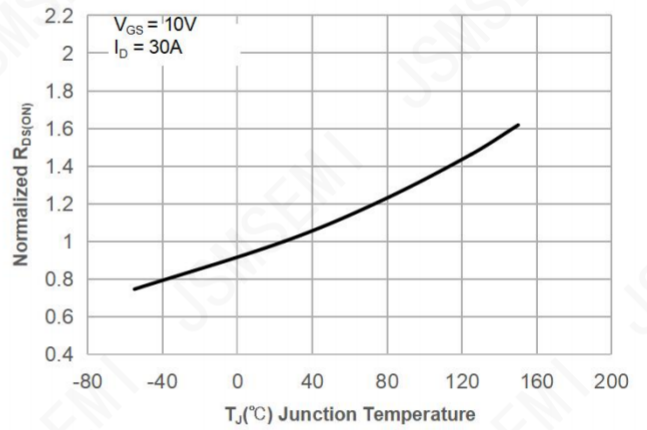


Figure 9: Maximum Safe Operating Area

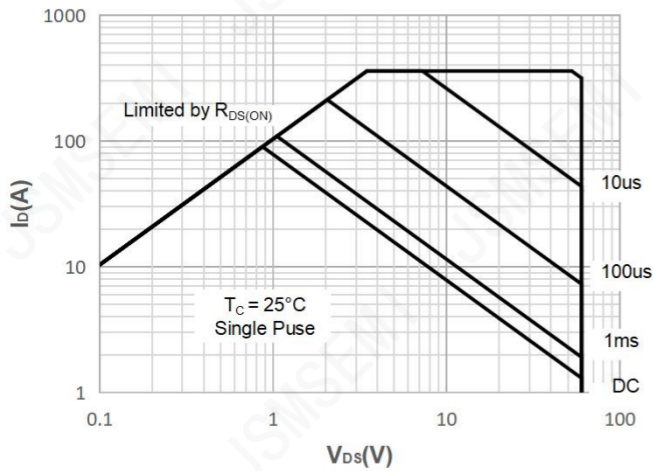


Figure 10: Maximum Continuous Driain Current vs. Case Temperature

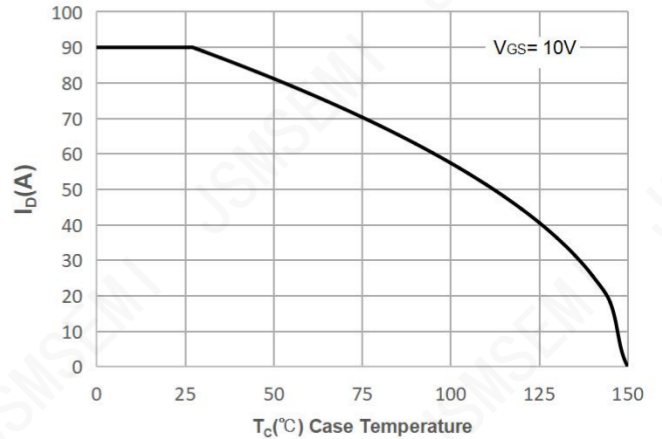


Figure 11: Normalized Maximum Transient Thermal Impedance

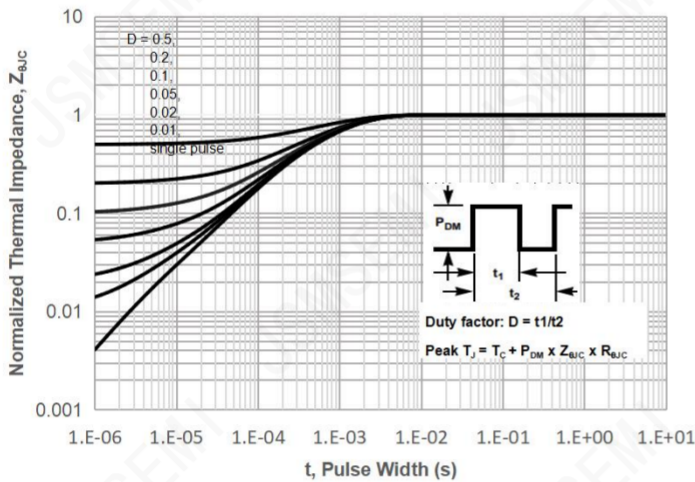
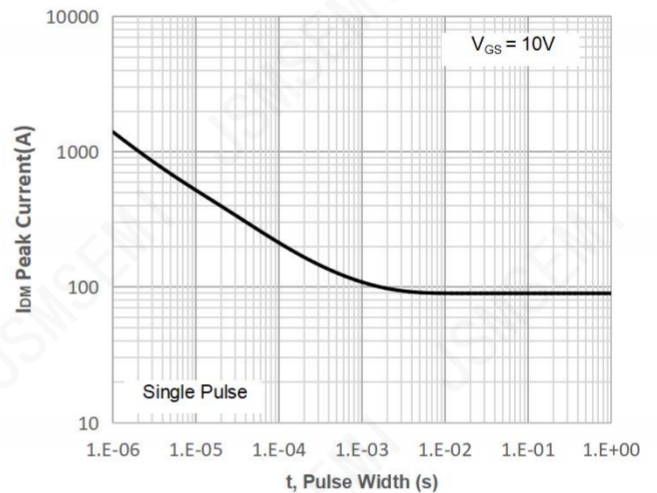
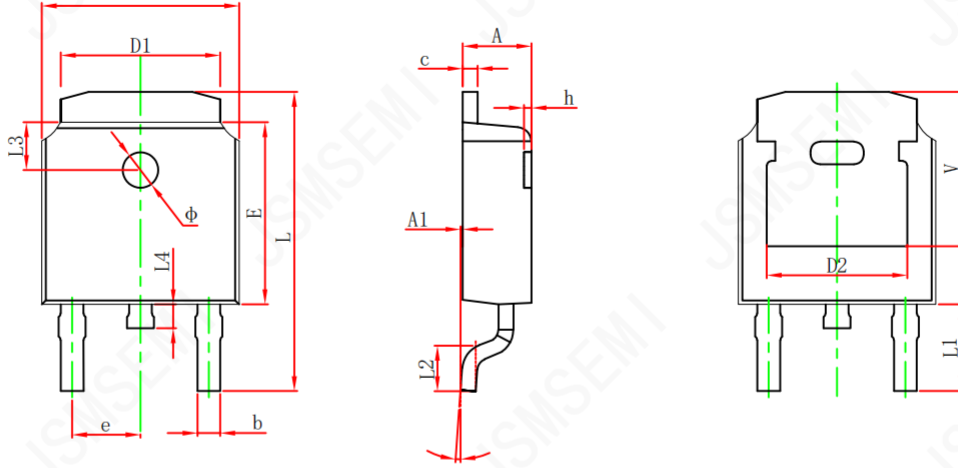
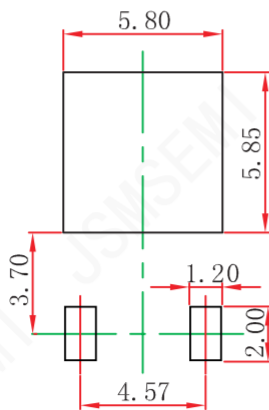


Figure 12: Peak Current Capacity



**Package Information**
**TO-252-2**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.635	0.770	0.025	0.030
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.712	10.312	0.382	0.406
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.250 REF.		0.207 REF.	

**TO-252-2L Suggested Pad Layout**

**Note:**

1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purposes only.

## Revision History

Rev.	Change	Date
V1.0	Initial version	6/27/2021

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