

## Product Summary

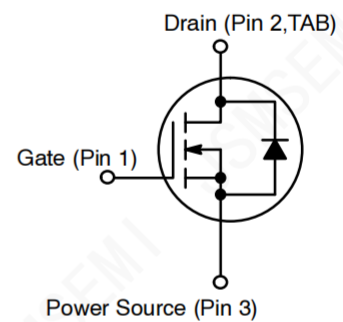
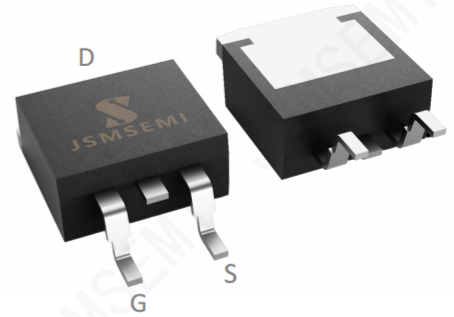
- $V_{DS}$  100V
- $I_D$  140A
- $R_{DS(ON)}$  ( at  $V_{GS}=10V$ )  $<4.5m\Omega$
- 100% EAS Tested
- 100%  $\nabla V_{DS}$  Tested

## 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 ( $T_J=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current ( $T_C=25^\circ C$ ) <sup>(1)</sup>	$I_D$	140	A
Continuous Drain Current ( $T_C=100^\circ C$ )	$I_D$	90	A
Pulsed Drain Current <sup>(1)</sup>	$I_{DM}$	560	A
Drain Power Dissipation	$P_D$	180	W
Single Pulsed Avalanche Energy <sup>(2)</sup>	$E_{AS}$	340	mJ
Thermal Resistance from Junction to Ambient <sup>(3)</sup>	$R_{\theta JA}$	43	$^\circ C/W$
Thermal Resistance from Junction to Case	$R_{\theta JC}$	1.0	$^\circ C/W$
Junction Temperature	$T_J$	-55~ +150	$^\circ C$
Storage Temperature	$T_{STG}$	-55~ +150	$^\circ C$

### Notes:

- 1) Repetitive Rating: pulse width limited by maximum junction temperature
- 2) EAS condition :  $T_J=25^\circ C$ ,  $V_{DD}=50V$ ,  $V_G=10V$ ,  $L=1.0mH$ ,  $R_g=25\Omega$ ,  $I_{AS}=44.7A$
- 3) The value of  $R_{\theta JA}$  Mounted on FR4 Board (25.4mm\*25.4mm\*t1.6mm) With 2oz Copper  $T_A=25^\circ C$

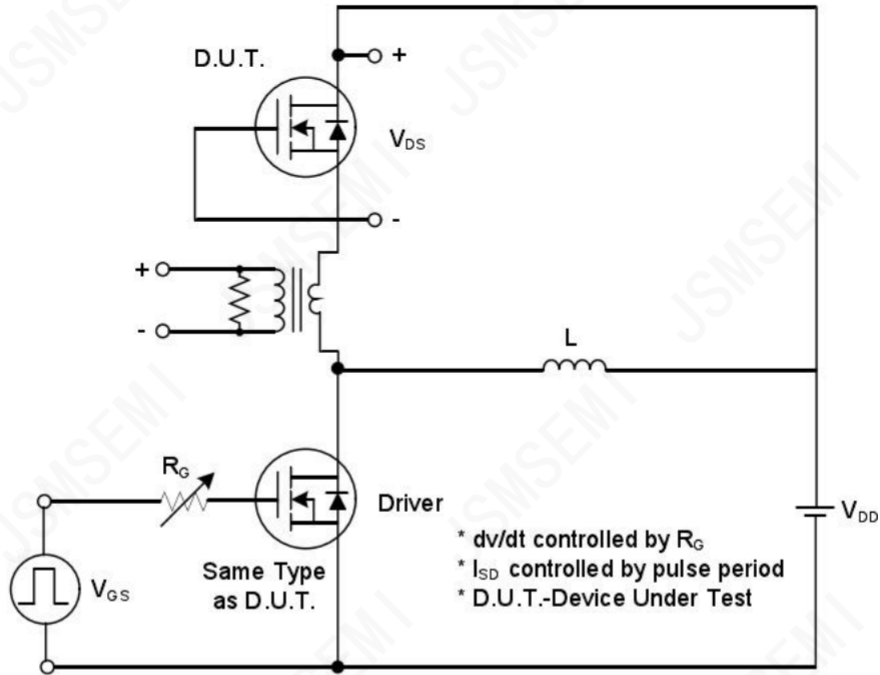
**MOSFET ELECTRICAL CHARACTERISTICS(T<sub>J</sub>=25°C unless otherwise noted)**

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	100	-	-	V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V	-	-	1	μA
Gate-body leakage current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	-	-	±100	nA
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	2.0	3.0	4.0	V
Drain-source on-resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A	-	4.0	4.5	mΩ
Forward transconductance	R <sub>g</sub>	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V, f = 1.0MHz	-	2.0	-	Ω
<b>Dynamic characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 50V, V <sub>GS</sub> = 0V, f = 1MHz	-	4628	-	pF
Output Capacitance	C <sub>oss</sub>		-	1624	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	19	-	
<b>Switching characteristics</b>						
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> = 50V, I <sub>D</sub> = 20A, R <sub>G</sub> = 3Ω, V <sub>GS</sub> = 10V	-	12	-	nS
Turn-on rise time	t <sub>r</sub>		-	26	-	
Turn-off delay time	t <sub>d(off)</sub>		-	38	-	
Turn-off fall time	t <sub>f</sub>		-	31	-	
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = 50V, I <sub>D</sub> = 20A, V <sub>GS</sub> = 10V	-	61	-	nC
Gate-Source Charge	Q <sub>gs</sub>		-	19.5	-	
Gate-Drain Charge	Q <sub>gd</sub>		-	8.7	-	
<b>Source-Drain Diode characteristics</b>						
Diode Forward voltage	V <sub>SD</sub>	T <sub>J</sub> = 25°C, V <sub>GS</sub> = 0V, I <sub>S</sub> = 20A	-	0.8	1.2	V
Diode Forward current	I <sub>S</sub>	T <sub>C</sub> = 25°C	-	-	140	A
Body Diode Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25°C, I <sub>F</sub> = 20A, di/dt = 100A/us	-	77	-	nS
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>		-	189	-	nC

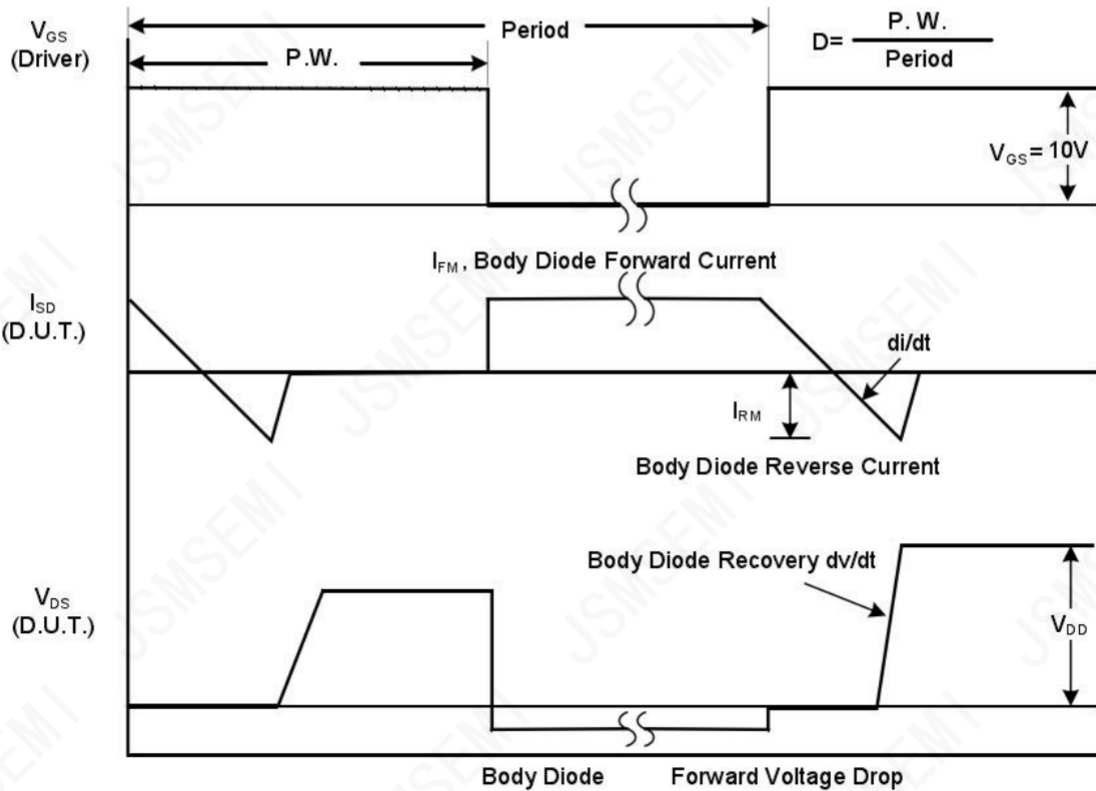
**Ordering Information**

Order number	Package	Marking	Operation Temperature Range	MSL Grade	Ship, Quantity	Green
IRFS4310ZTRLPBF-JSM	TO-263	FS4310	-55 to 150°C	1	T&R, 800	Rohs

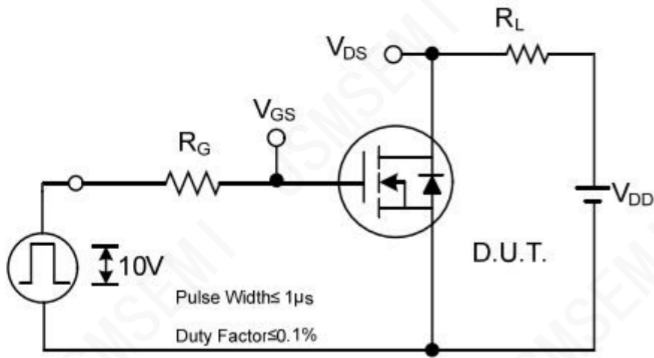
■ RATING AND CHARACTERISTIC CURVES



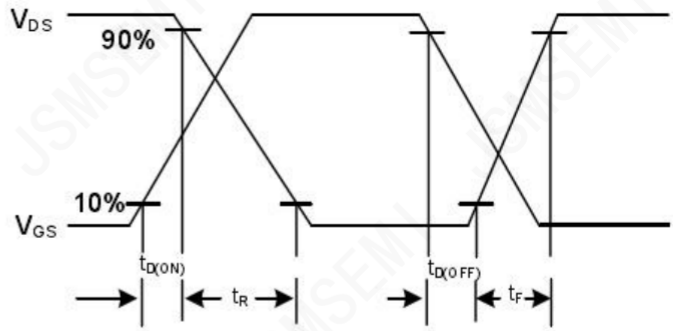
Peak Diode Recovery  $dv/dt$  Test Circuit



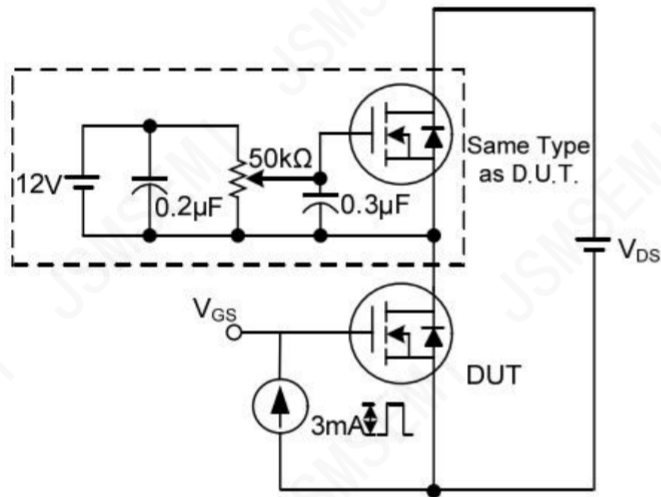
Peak Diode Recovery  $dv/dt$  Waveforms



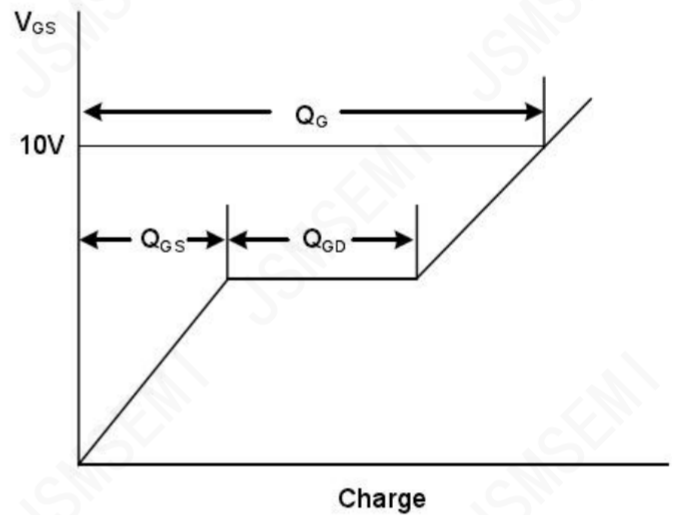
Switching Test Circuit



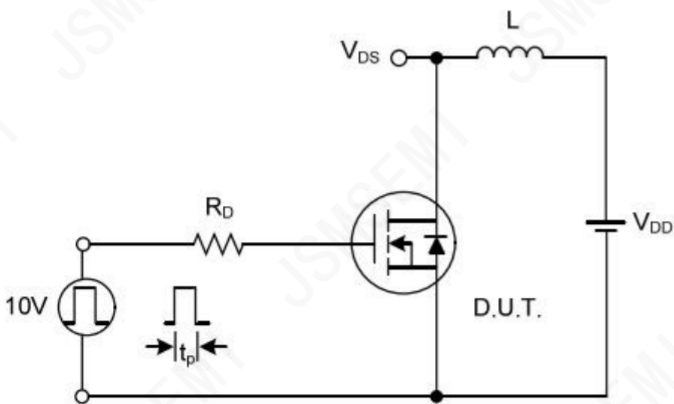
Switching Waveforms



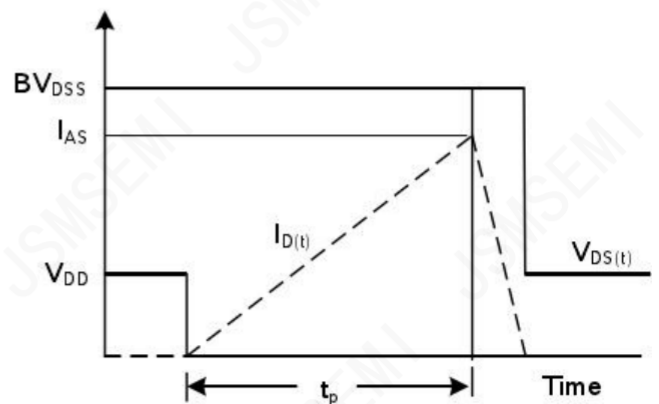
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

### Typical Characteristics

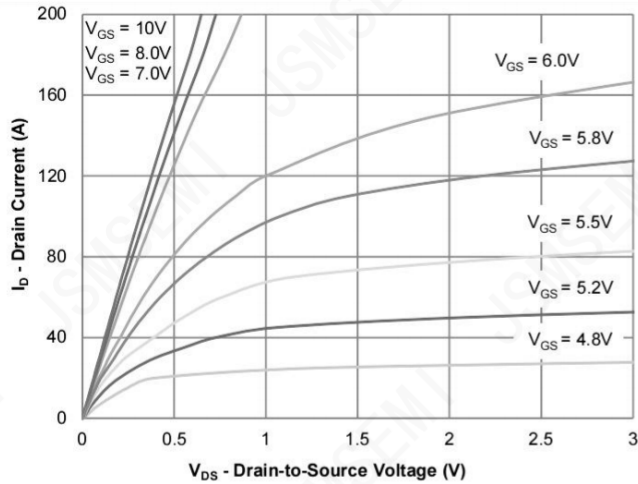


Figure 1: Output Characteristics

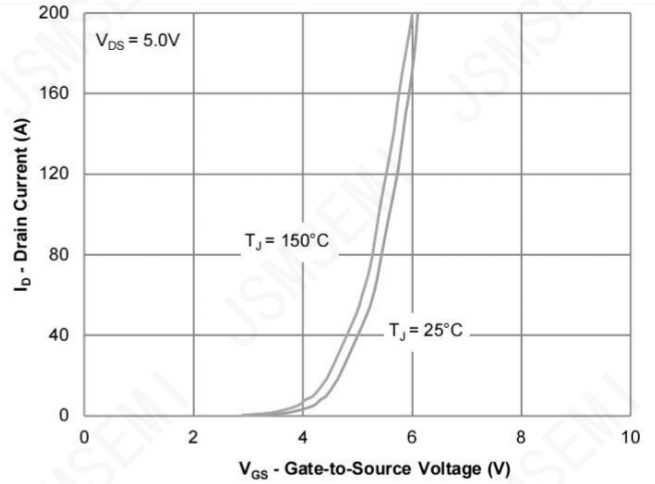


Figure 2: Transfer Characteristics

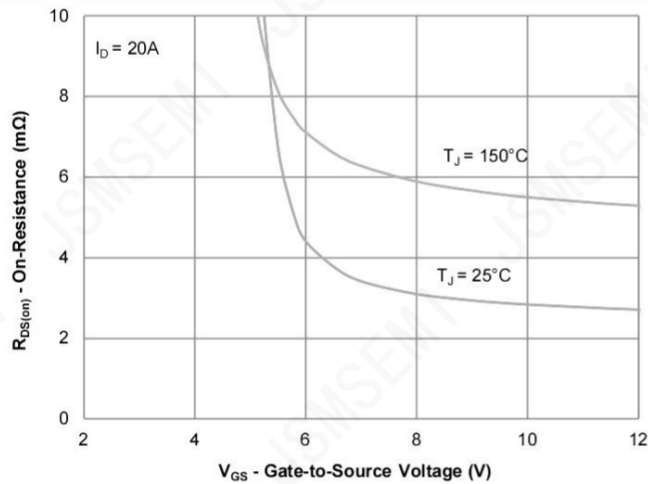


Figure 3: On-Resistance vs. Gate-Source Voltage

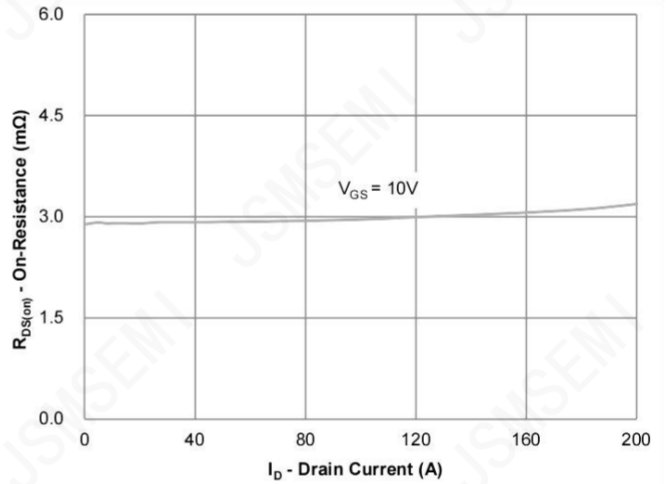


Figure 4: On-Resistance vs. Drain Current

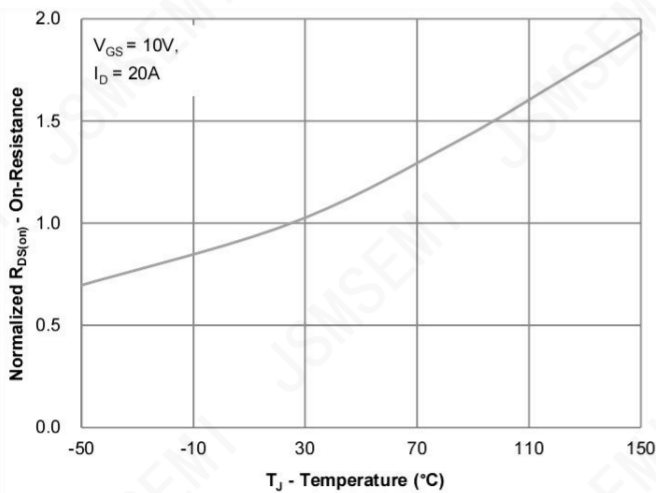


Figure 5: On-Resistance vs. Junction Temperature

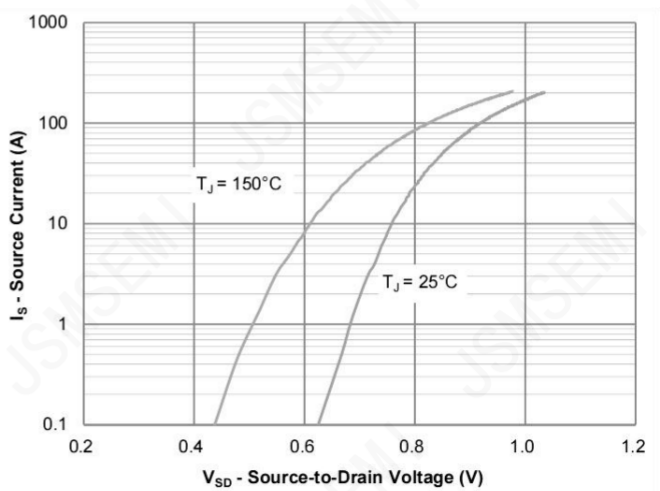


Figure 6: Source-Drain Diode Forward Voltage

**Typical Characteristics**

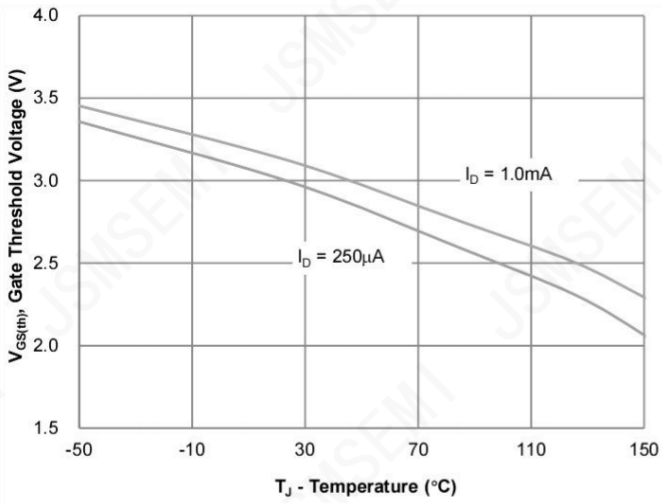


Figure 7: Gate Threshold Variation vs. Junction Temperature

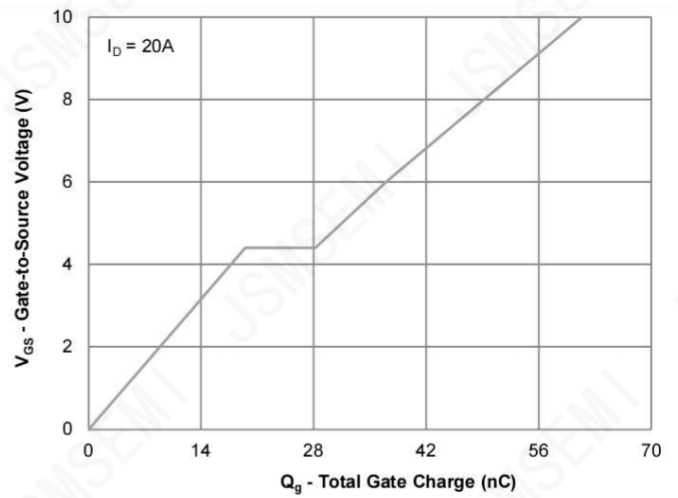


Figure 8: Gate Charge Characteristics

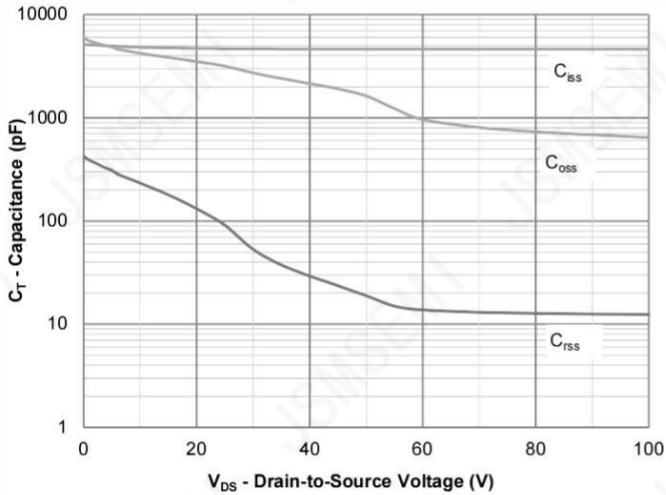


Figure 9: Capacitance Characteristics

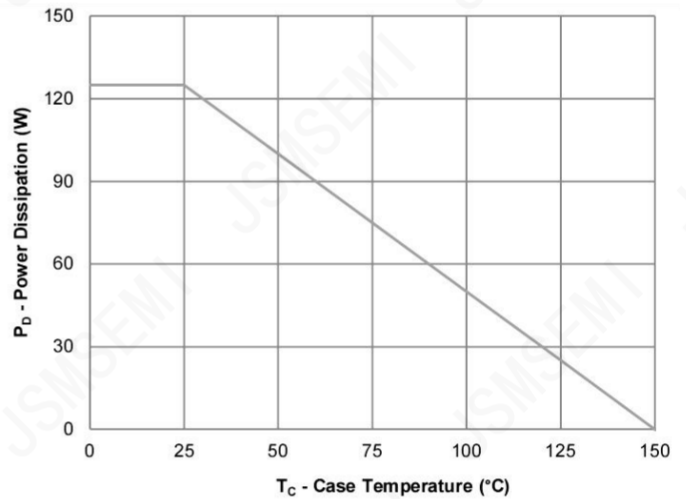


Figure 10: Power Derating

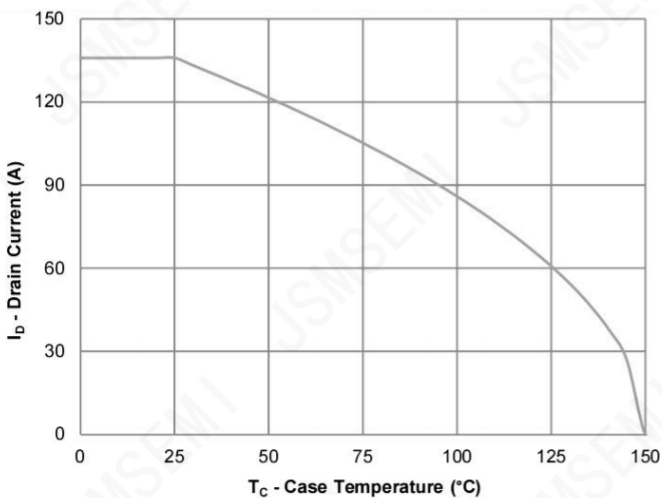


Figure 11: Current Derating

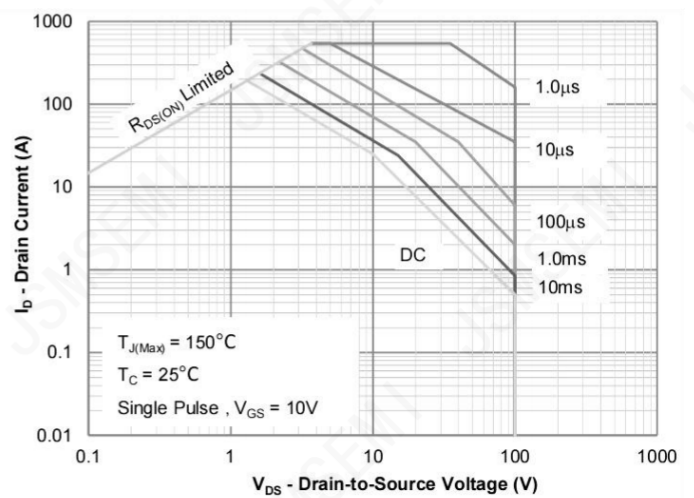


Figure 12: Safe Operating Area

### Typical Characteristics

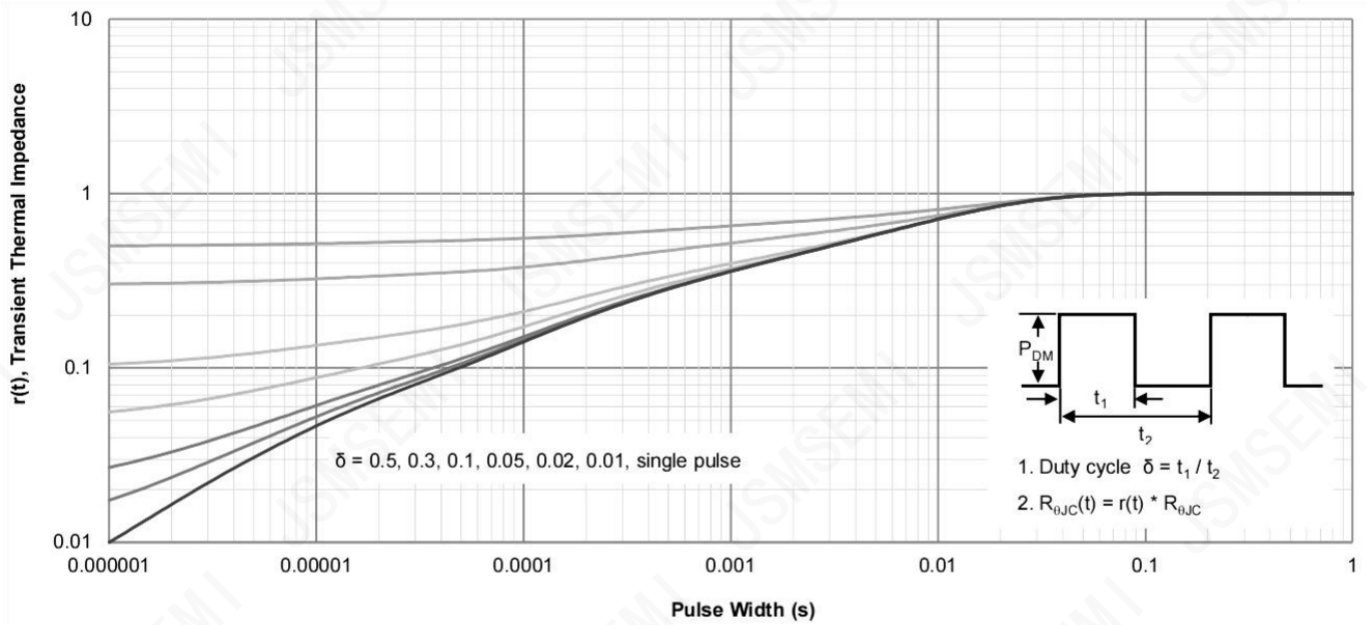
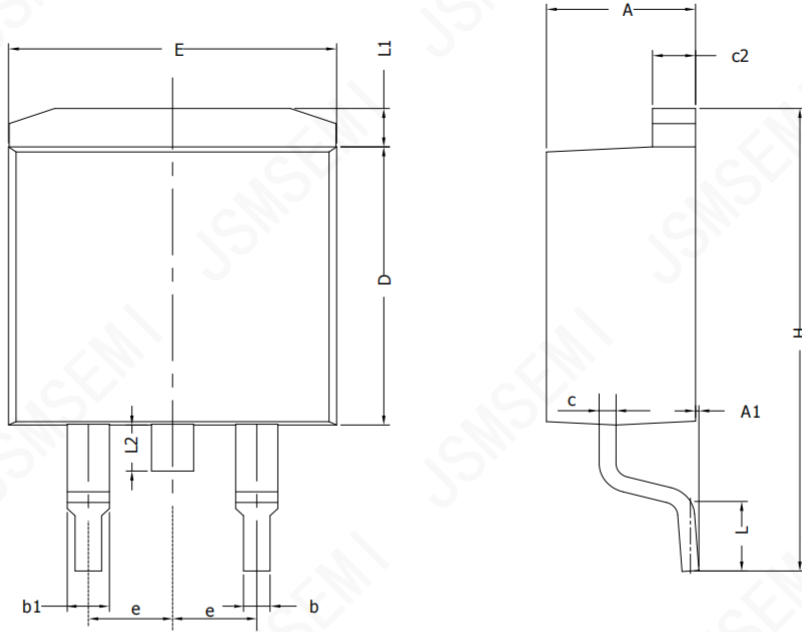


Figure 13: Normalized Maximum Transient Thermal Impedance

Package Information

TO-263-2



SYMBOL	MIN	NOM	MAX
A	4.30	4.57	4.72
A1	0	0.10	0.25
b	0.71	0.81	0.91
c	0.30	---	0.60
c2	1.17	1.27	1.37
D	8.50	---	9.35
E	9.80	---	10.45
e	2.54BSC		
H	14.70	---	15.75
L	2.00	2.30	2.74
L1	1.12	1.27	1.42
L2	---	---	1.75

## Revision History

Rev.	Change	Date
V1.0	Initial version	9/17/2020

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