JJMICROELECTRONICS

650V, 53A, 34mΩ N-channel Power Super Junction MOSFET

JMH65R040PSFD

Features

- Excellent $R_{DS(ON)}$ and Low Gate Charge
- 100% UIS Tested
- 100% ΔVds Tested
- Halogen-free; RoHS-compliant

Applications

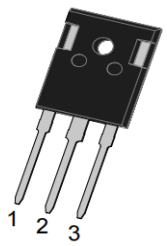
- SMPS with PFC
- Flyback and LLC topologies
- Silver ATX,adapter,TV,lighting,Telecom

Product Summary

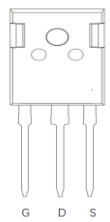
Parameters	Value	Unit
V_{DSS}	650	V
$V_{GS(th)_Typ}$	3.9	V
I_D(@V_{GS}=10V)	53	A
$R_{DS(ON)_Typ}$(@V_{GS}=10V	34	mΩ

RoHS

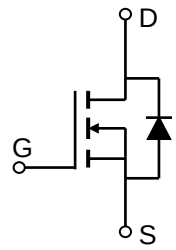
Pb Lead-free Green



TO-247-3L Top View



Pin Assignment



Schematic Diagram

Ordering Information

Device	Marking	MSL	Form	Package	Tube(pcs)	Per Carton (pcs)
JMH65R040PSFD-U	65R040PF	N/A	Tube	TO-247-3L	30	2250

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

Symbol	Parameter		Value	Unit
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	53	A
		T_C = 100°C	33	
I_{DM}	Pulsed Drain Current (1)		Refer to Fig.4	A
E_{AS}	Single Pulsed Avalanche Energy (2)		794	mJ
P_D	Power Dissipation	T_C = 25°C	278	W
		T_C = 100°C	111	
T_J, T_{STG}	Junction & Storage Temperature Range		-55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient(3)	40	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.45	

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Electrical Characteristics (T_J = 25°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	-	-	10.0	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	2.7	3.9	5.1	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(4)	V_{GS} = 10V, I_D = 30A	-	34	40	mΩ
Dynamic Characteristics						
R_g	Gate Resistance	f = 1MHz	-	1.0	-	Ω
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 325V, f = 1MHz	4463	6248	8435	pF
C_{oss}	Output Capacitance		94	131	177	pF
C_{rss}	Reverse Transfer Capacitance		-	8.4	-	pF
Q_g	Total Gate Charge	V_{GS} = 0 to 10V V_{DS} = 325V, I_D = 36A	89	124	168	nC
Q_{gs}	Gate Source Charge		31	43	58	nC
Q_{gd}	Gate Drain("Miller") Charge		32	45	61	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} = 10V, V_{DD} = 325V I_D= 36A, R_{GEN} = 24Ω	-	129	-	ns
t_r	Turn-On Rise Time		-	124	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	311	-	ns
t_f	Turn-Off Fall Time		-	96	-	ns
Body Diode Characteristics						
I_S	Maximum Continuous Body Diode Forward Current		-	-	53	A
I_{SM}	Maximum Pulsed Body Diode Forward Current		-	-	211	A
V_{SD}	Body Diode Forward Voltage	V_{GS} = 0V, I_S = 30A	-		1.2	V
trr	Body Diode Reverse Recovery Time	I_F = 40A, di/dt = 100A/us	140	196	265	ns
Qrr	Body Diode Reverse Recovery Charge		-	1700	-	nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. E_{AS} condition: Starting T_J=25C, V_{DD}=50V, V_{GS}=10V, R_G=25ohm, L=10mH, I_{AS}=12.6A, V_{DD}=0V during time in avalanche.
3. $R_{\theta JA}$ is measured with the device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
4. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%.

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Typical Performance Characteristics

Figure 1: Power De-rating

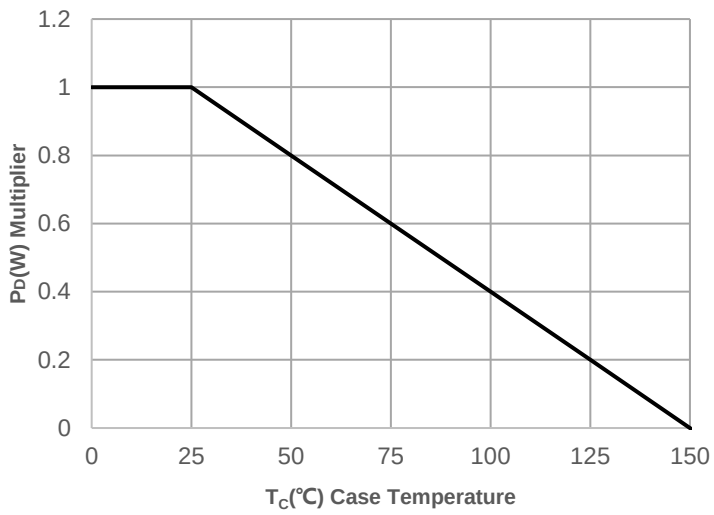


Figure 2: Current De-rating

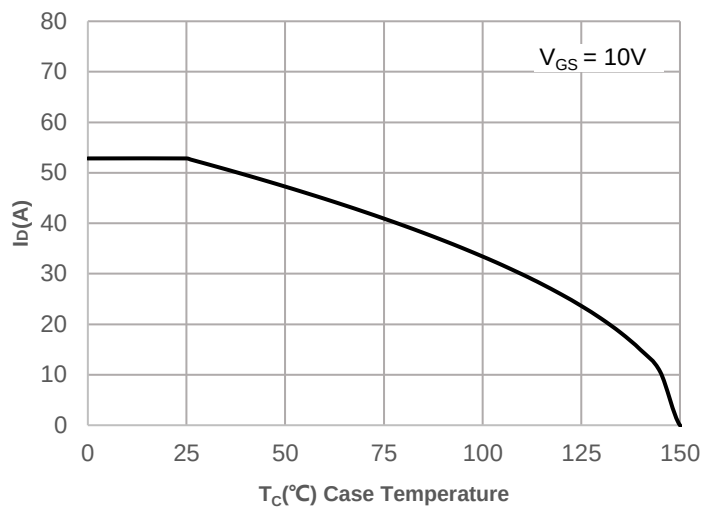


Figure 3: Normalized Maximum Transient Thermal Impedance

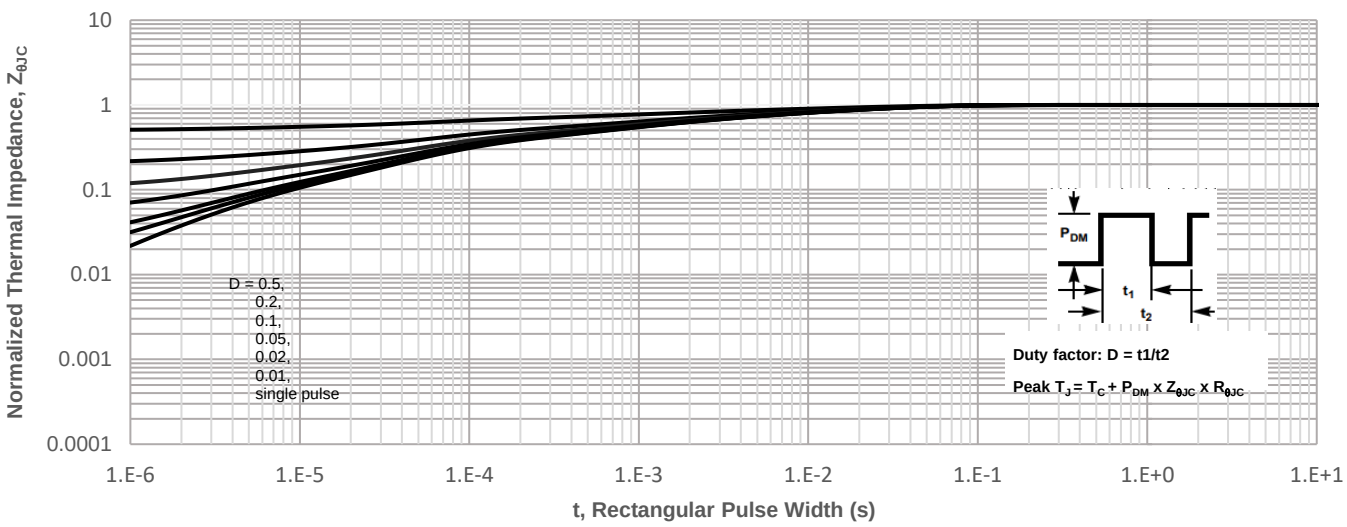
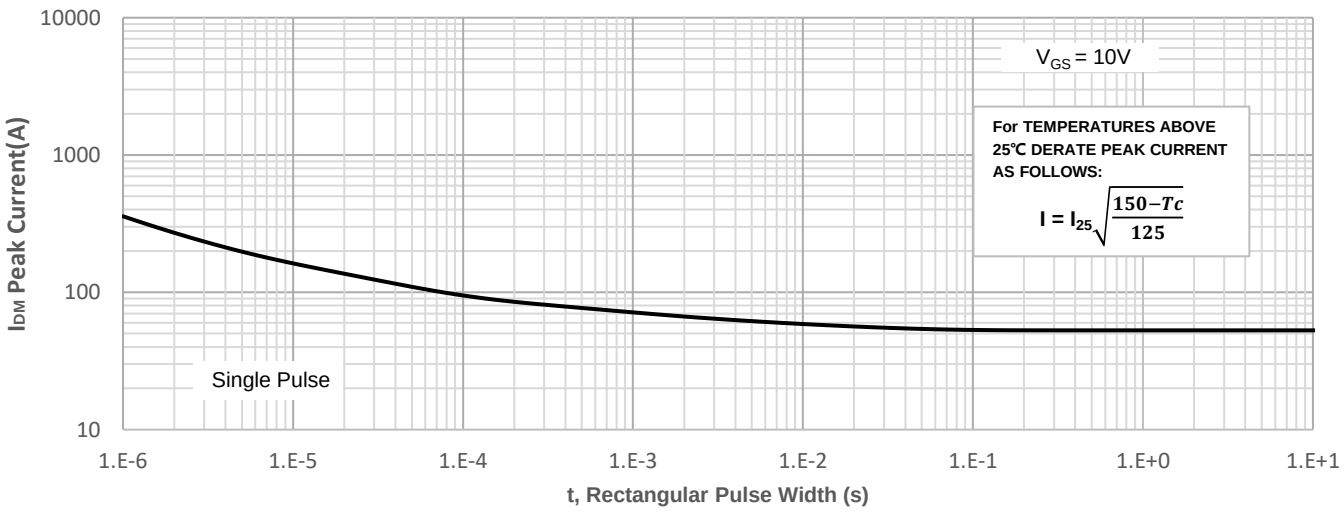


Figure 4: Peak Current Capacity



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Typical Performance Characteristics

Figure 5: Output Characteristics

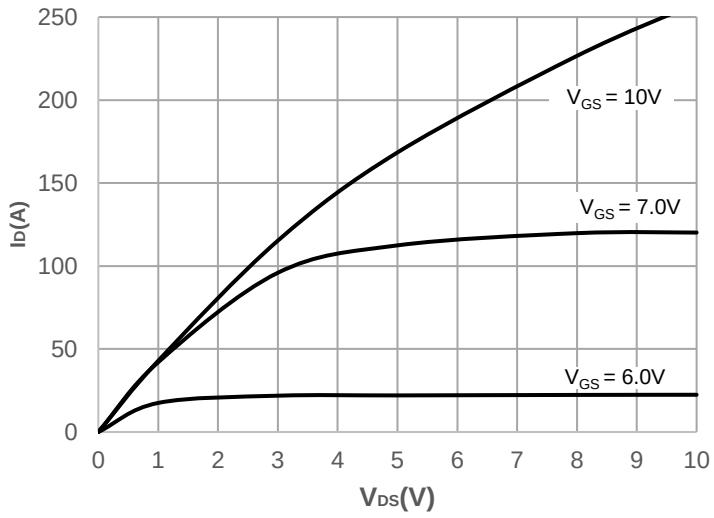


Figure 6: Typical Transfer Characteristics

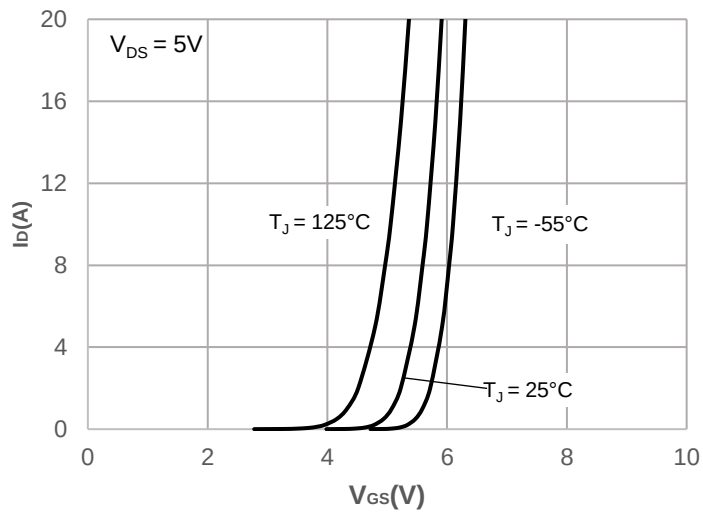


Figure 7: On-resistance vs. Drain Current

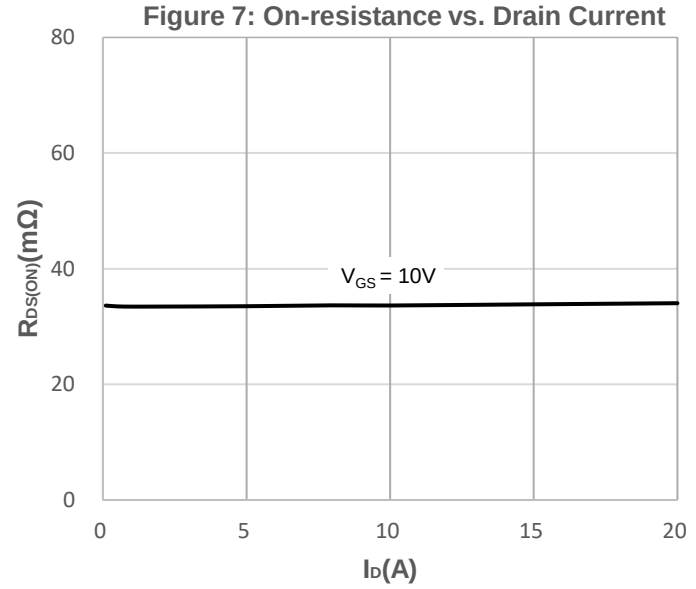


Figure 8: Body Diode Characteristics

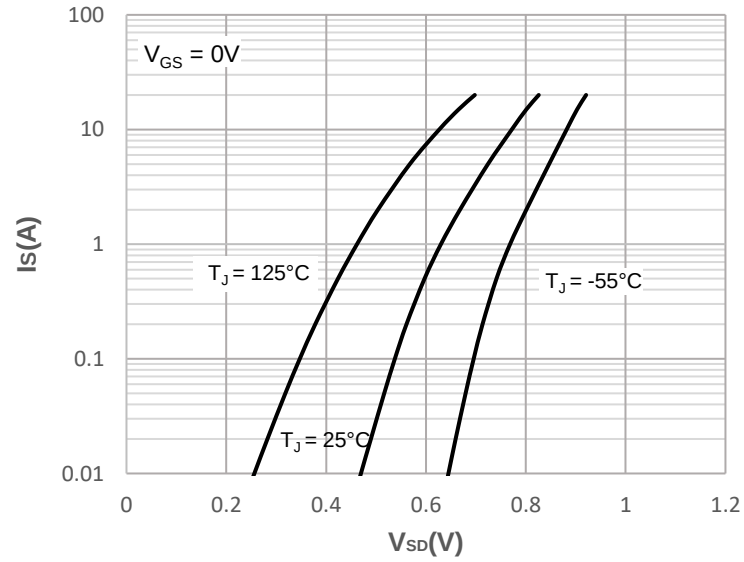


Figure 9: Gate Charge Characteristics

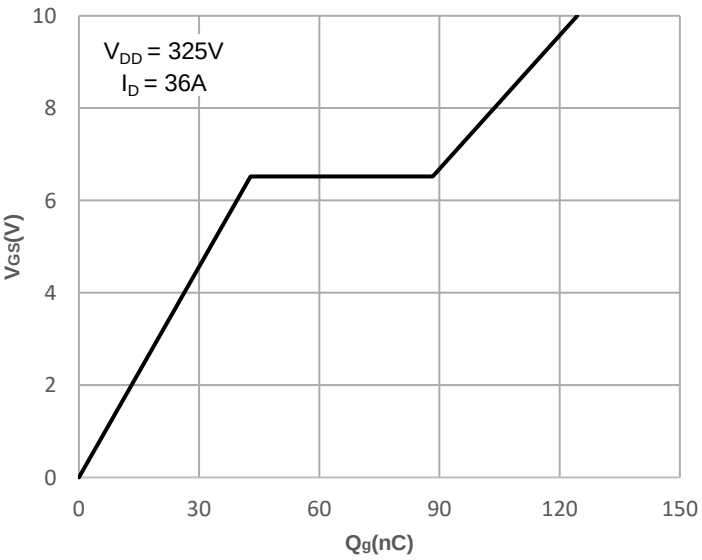
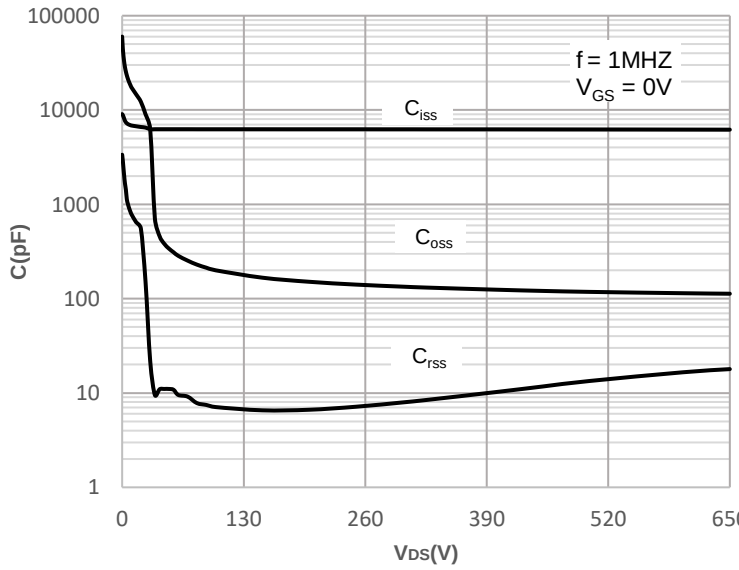


Figure 10: Capacitance Characteristics



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Typical Performance Characteristics

Figure 11: Normalized Breakdown voltage vs. Junction Temperature

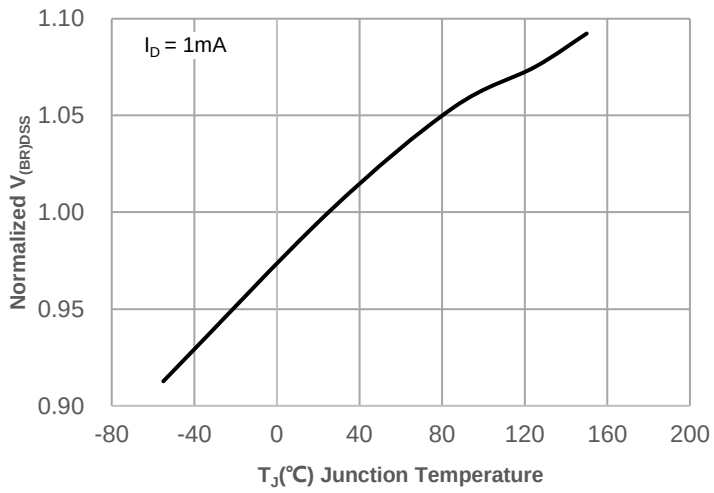


Figure 12: Normalized on Resistance vs. Junction Temperature

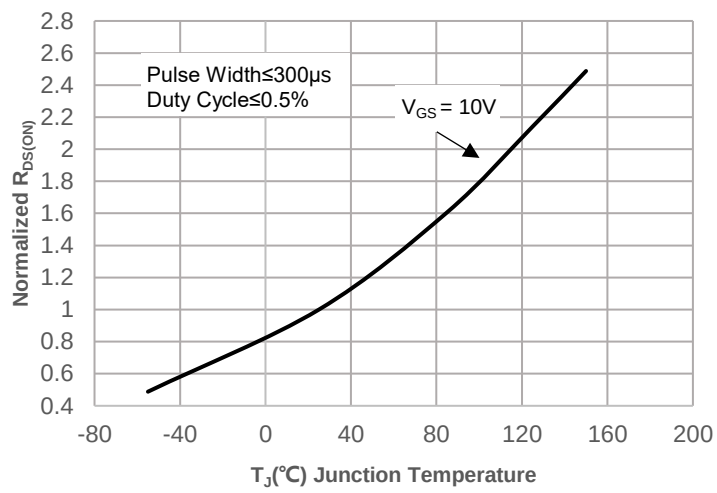


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

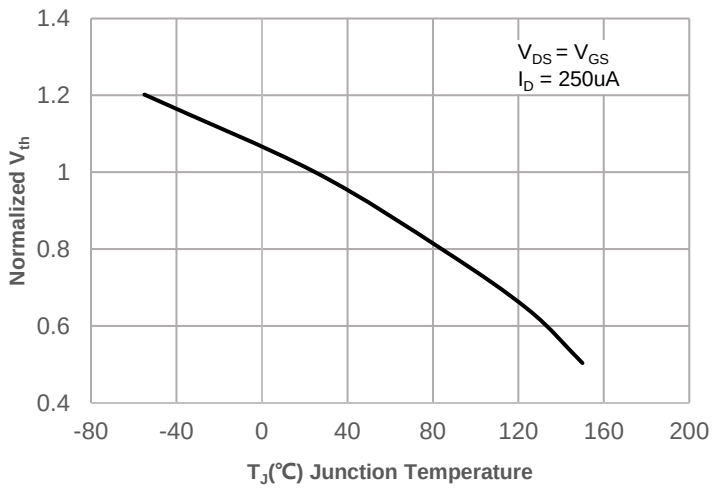


Figure 14: $R_{DS(ON)}$ vs. V_{GS}

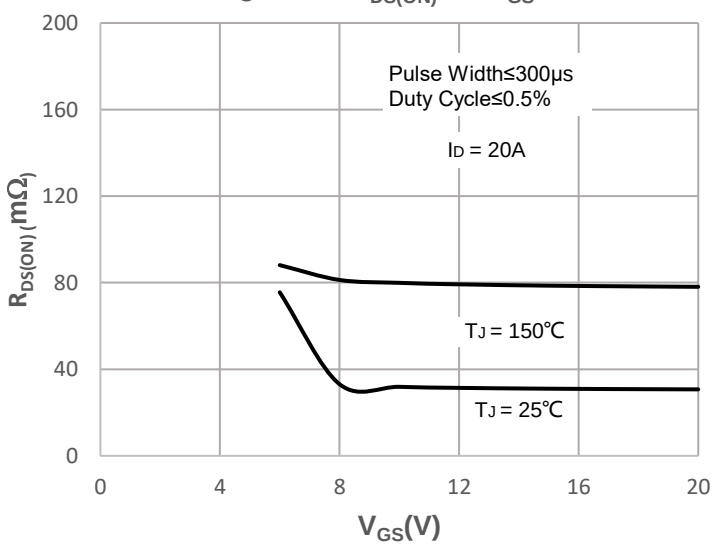
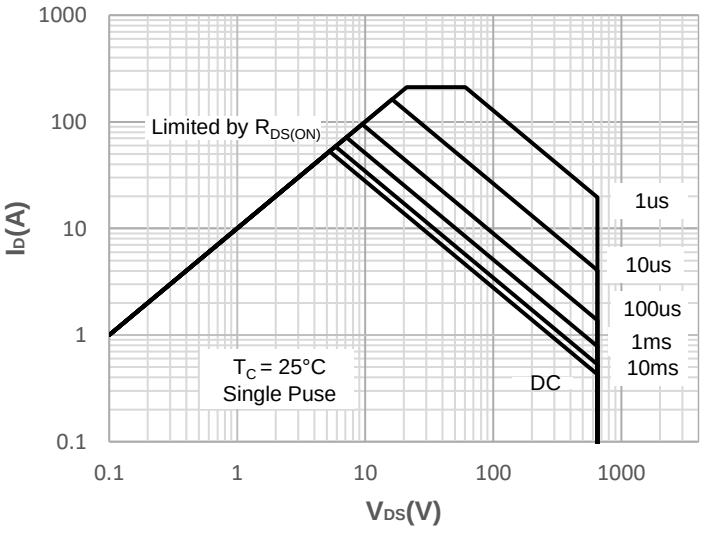


Figure 15: Maximum Safe Operating Area



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Test Circuit

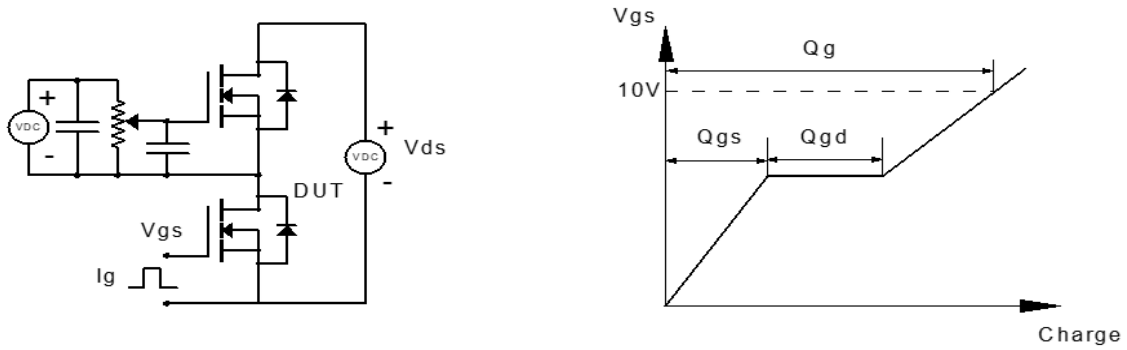


Figure 1: Gate Charge Test Circuit & Waveform

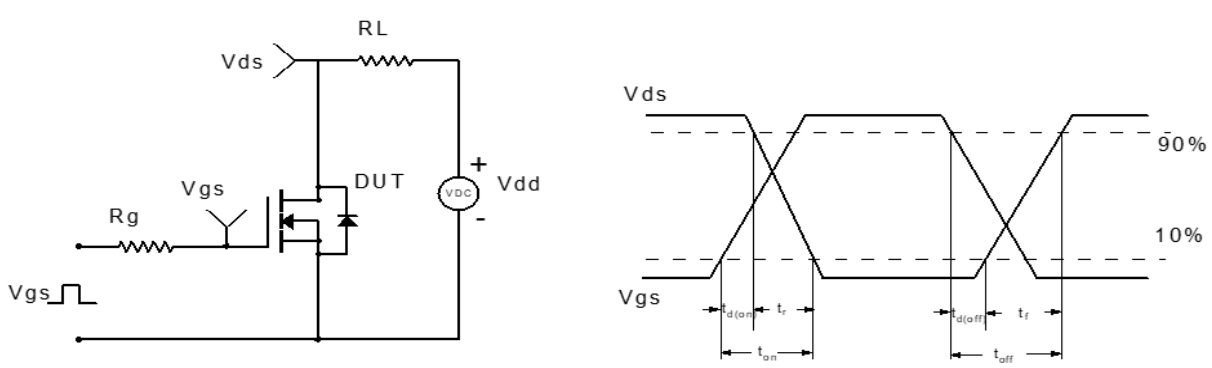


Figure 2: Resistive Switching Test Circuit & Waveform

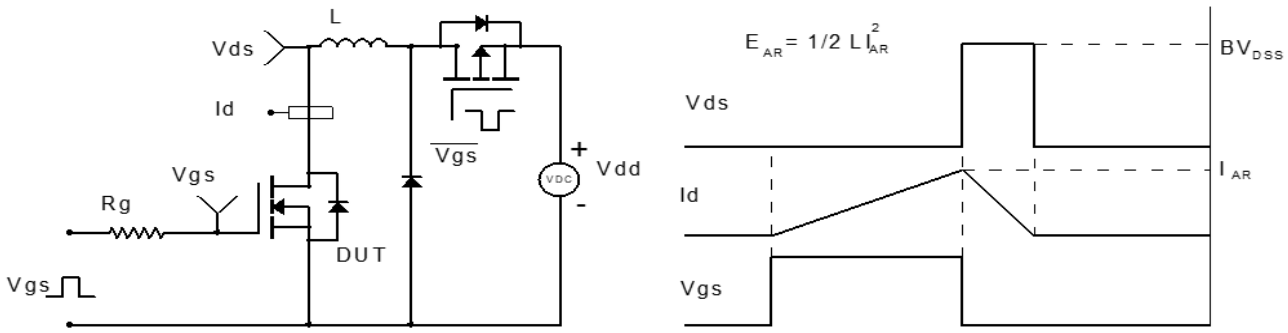


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

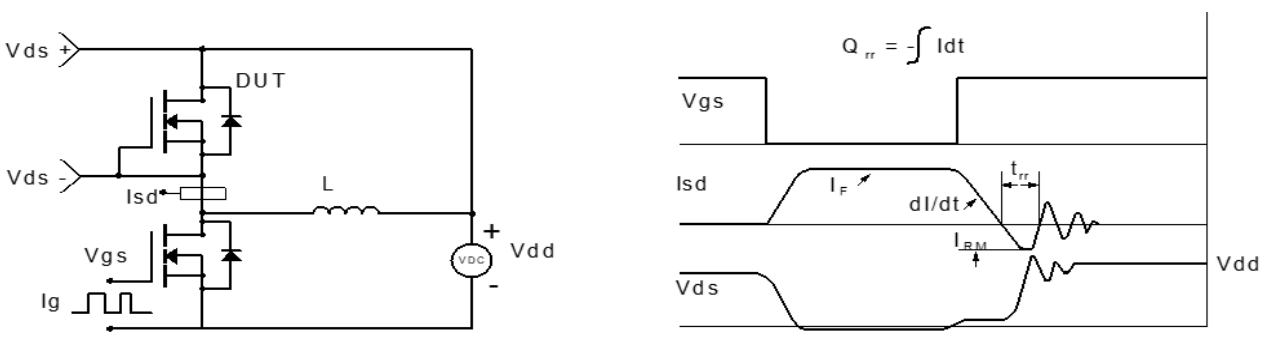
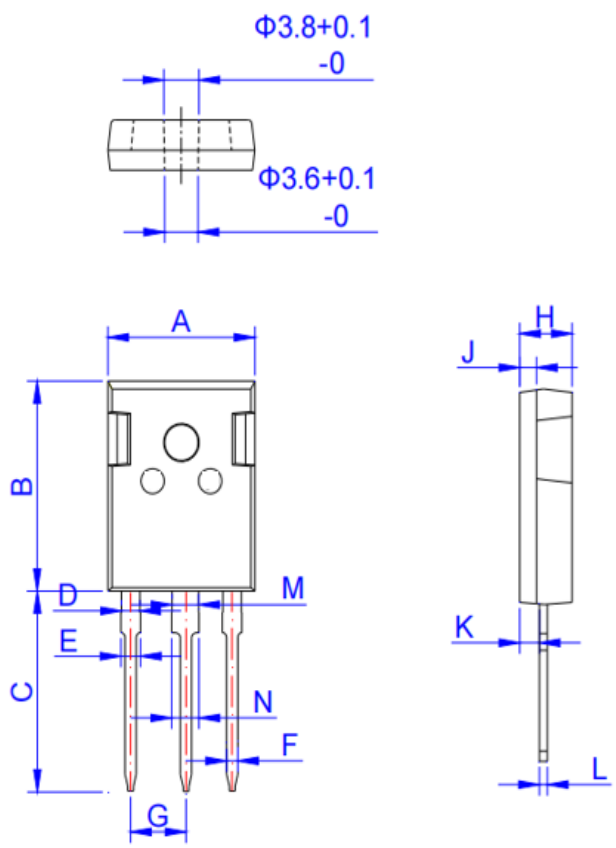


Figure 4: Diode Recovery Test Circuit & Waveform

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Package Mechanical Data(TO-247-3L)

Package Outline



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	15.50	15.80	16.10	0.610	0.622	0.634
B	20.80	21.00	21.20	0.819	0.827	0.835
C	19.70	20.00	20.30	0.776	0.787	0.799
D	1.80	2.00	2.20	0.071	0.079	0.087
E	1.90	2.10	2.30	0.075	0.083	0.091
F	1.00	1.20	1.40	0.039	0.047	0.055
G	5.25		5.65	0.207		0.222
H	4.80	5.00	5.20	0.189	0.197	0.205
J	1.90	2.00	2.10	0.075	0.079	0.083
K	2.20	2.35	2.50	0.087	0.093	0.098
L	0.41	0.60	0.79	0.016	0.024	0.031
M	2.80	3.00	3.20	0.110	0.118	0.126
N	2.90	3.10	3.30	0.114	0.122	0.130

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