S2M065R030W

SiC Power MOSFET

Features:

- 650V High Blocking Voltage
- Low On-Resistance
- High Speed Switching
- Easy to Parallel

Benefits:

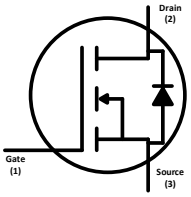
- Increased frequency
- Minimal switching loss
- Higher Efficiency
- Low cooling requirement

Symbol	Value	Unit
V_{DS}	650	V
I_{DS} (Tc=25ºC)	100	A
R_{DSon}	28	mΩ

Outline

TO-247-3

Circuit



Applications:

- Switch Mode Power Supply
- High Voltage DC/DC Converters
- Solar Inverters
- Motor Drivers

Maximum Ratings (Tc=25°C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions
V_{DSmax}	Drain-Source Voltage	650	V	V_{GS}=0V, I_{DS}=100μA
V_{GSmax}	Gate-Source Voltage	-10/+25	V	Absolute Maximum values
V_{GSop}	Gate-Source Voltage	-5/+20	V	Recommended operational values
I_{DS}	Continuous Drain Current	100 63	A	V_{GS}=20V, T_C =25°C V_{GS}=20V, T_C =100°C
$I_{DS(pulse)}$	Pulsed Drain Current	160	A	Pulse width t_p limited by T_{Jmax}
P_D	Power Dissipation	312	W	T_C =25°C, T_J =150°C
$T_{J,max}$	Operating Junction Temperature	150	°C	
T_{stg}	Storage Temperature Range	-55 to 150	°C	

Thermal characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit
R_{thJC}	Thermal resistance		0.40		°C/W

Electrical Characteristics (T_C=25°C unless otherwise specified)

Symbol	Parameter	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	650			V	V_{GS}=0V, I_{DS}=100μA
$V_{GS(th)}$	Gate Threshold Voltage	1.4	2.0 1.3	2.4	V	V_{DS}=V_{GS}, I_{DS}=13mA, T_J =25°C V_{DS}=V_{GS}, I_{DS}=13mA, T_J=150°C
I_{DSS}	Zero Gate Voltage Drain Current		10	100	μA	V_{DS}=650V, V_{GS}=0V
I_{GSS}	Gate-Source Leakage Current			250	nA	V_{GS}=20V, V_{DS}=0V
R_{DSon}	Drain-Source On-State Resistance		28 32	32	mΩ	V_{GS}=20V, I_{DS}=55A, T_J =25°C V_{GS}=20V, I_{DS}=55A, T_J=150°C
g_{fs}	Transconductance		10.6		S	V_{DS}=20V, I_{DS}=20A
$R_{G,int}$	Internal Gate Resistance		1.2		Ω	f=1 MHz, V_{AC}=25mV
C_{ISS}	Input Capacitance		6391		pF	V_{DS}=600V, V_{GS}=0V f=1 MHz, V_{AC}=25mV
C_{OSS}	Output Capacitance		410			
C_{RSS}	Reverse Transfer Capacitance		37			
E_{OSS}	C_{OSS} Stored Energy		77		μJ	
E_{on}	Turn-On Switching Energy		676		μJ	V_{DD}=400V, V_{GS}=-5/20V, I_{DS}=55A, $R_{G(EXT)}$=2Ω, L=0.2mH
E_{off}	Turn-off Switching Energy		131			
$t_{d(on)}$	Turn-On Delay Time		16		ns	V_{DD}=400V, V_{GS}=-5/20V, I_{DS}=55A, $R_{G(EXT)}$=2Ω, R_L=7.27 Ω, Timing relative to V_{DS}
t_r	Rise Time		18			
$t_{d(off)}$	Turn-off Delay Time		34			
t_f	Fall Time		17			
Q_{GS}	Gate to Source Charge		40		nC	V_{GS}=-5/20V, V_{DS}=400V, I_{DS}=55A
Q_{GD}	Gate to Drain Charge		48			
Q_G	Total Gate Charge		218			

Body Diode Characteristics

Symbol	Parameter	Value			Unit	Test Conditions
		Min.	Typ.	Max.		
V_{SD}	Diode Forward Voltage		4.6 3.9		V	V_{GS}=-5V, I_{SD}=17A, T_J =25°C V_{GS}=-5V, I_{SD}=17A, T_J=150°C
I_{SD}	Continuous Diode Current		61		A	
t_{rr}	Reverse Recovery Time		86		ns	V_{GS}=-5V, I_{SD}=55A, VR=400V, di/dt=1820A/μs
Q_{rr}	Reverse Recovery Charge		225		nC	
I_{rrm}	Peak Reverse Recovery Current		16.3		A	

Typical Performance

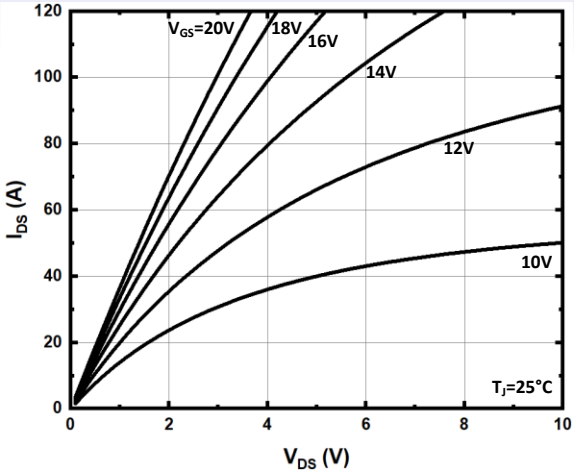


Fig. 1 Output Characteristics, T_J=25°C

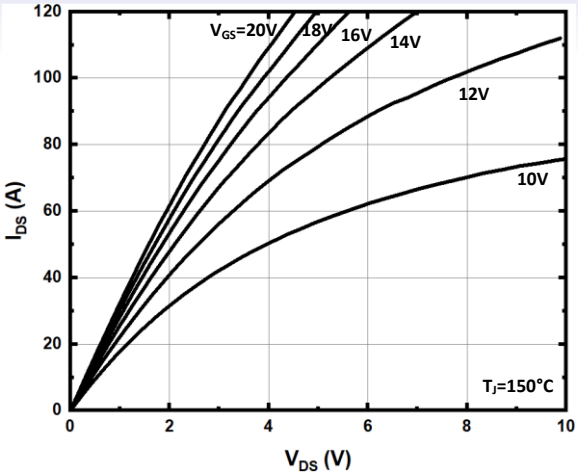


Fig. 2 Output Characteristics, T_J=150°C

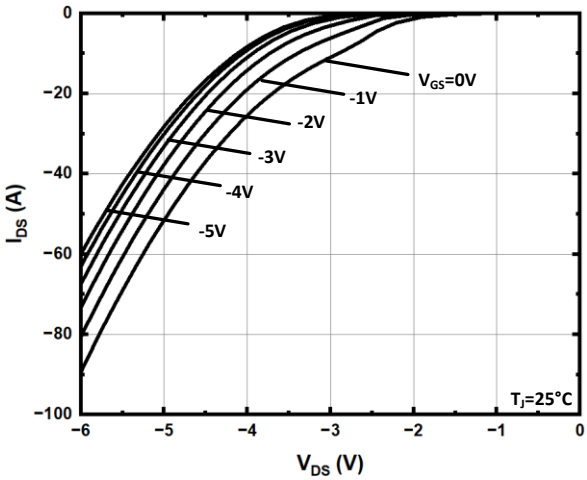


Fig. 3 Body Diode Characteristics, T_J=25°C

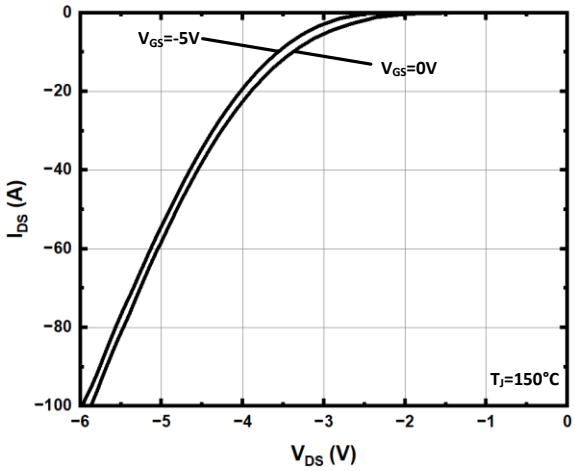


Fig. 4 Body Diode Characteristics, T_J=150°C

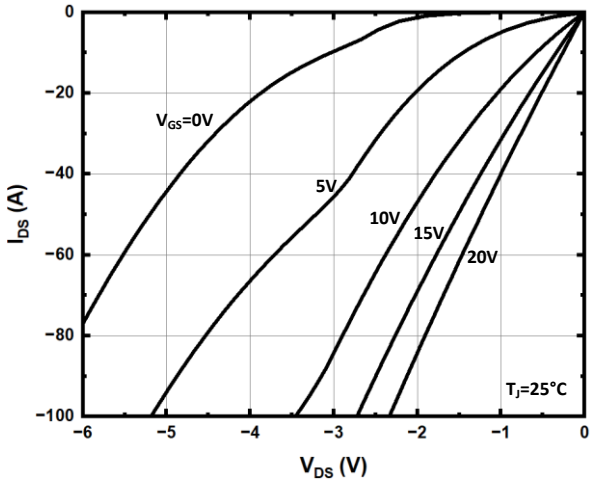


Fig. 5 3rd Quadrant Characteristics, T_J=25°C

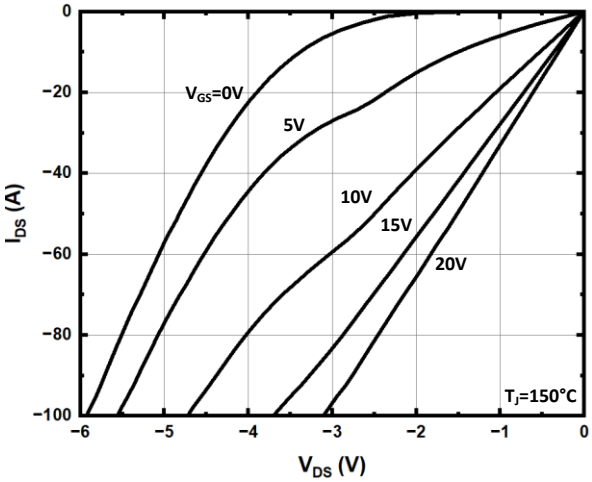


Fig. 6 3rd Quadrant Characteristics, T_J=150°C

Typical Performance

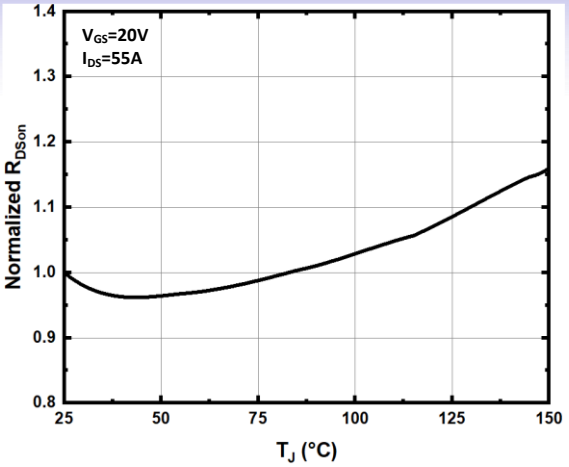


Fig. 7 Normalized On-Resistance vs Temperature

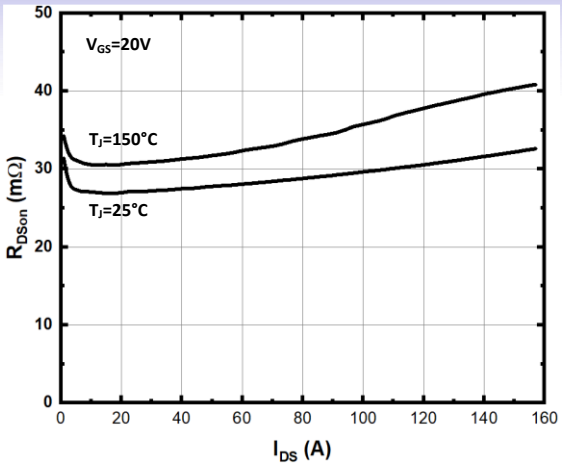


Fig. 8 On-Resistance vs Drain Current

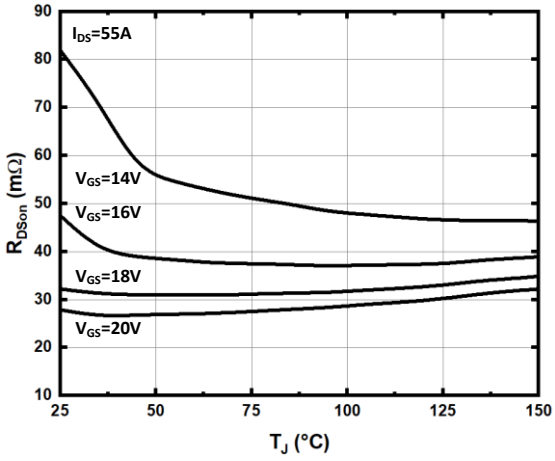


Fig. 9 On-Resistance vs Temperature

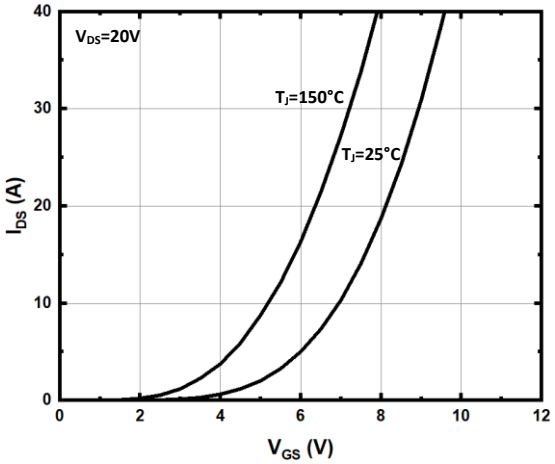


Fig. 10 Transfer Characteristics

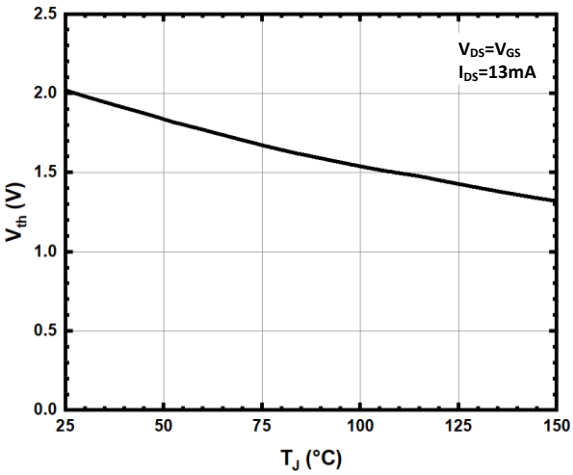


Fig. 11 Threshold Voltage vs. Temperature

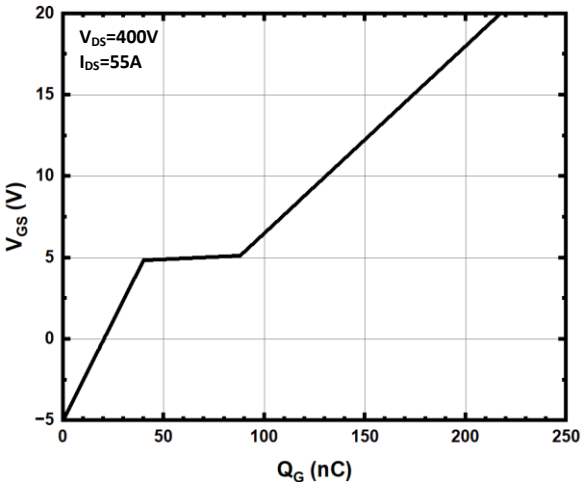


Fig. 12 Gate Charge Characteristics

Typical Performance

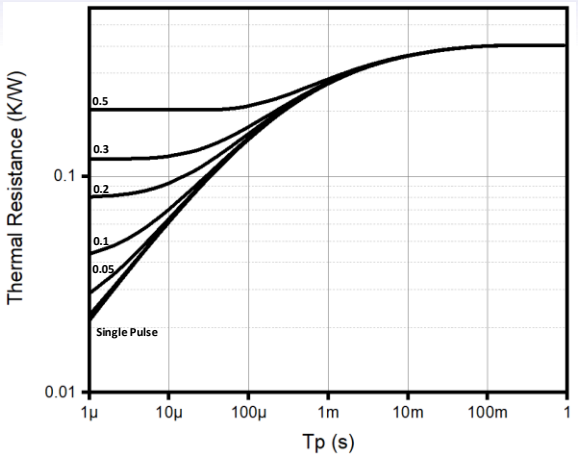


Fig. 13 Transient Thermal Impedance

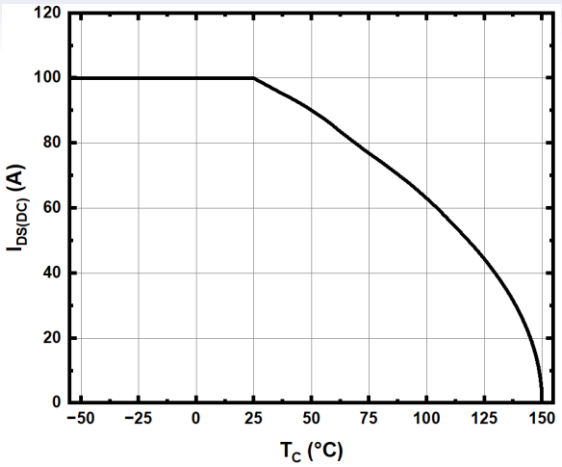


Fig. 14 Continuous Drain Current Derating

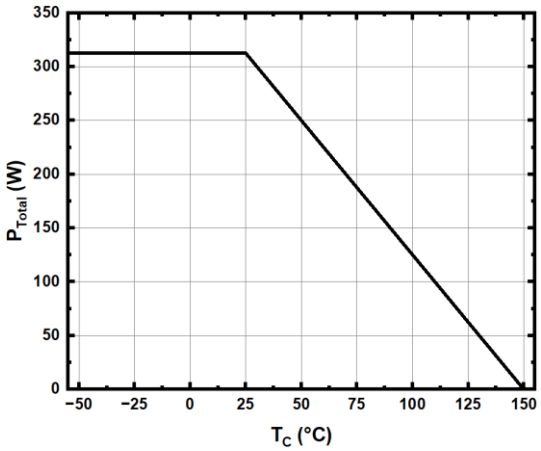


Fig. 15 Power Derating

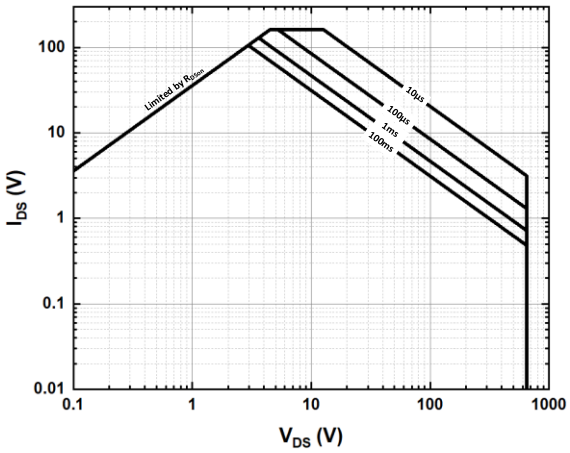


Fig. 16 Safe Operating Area

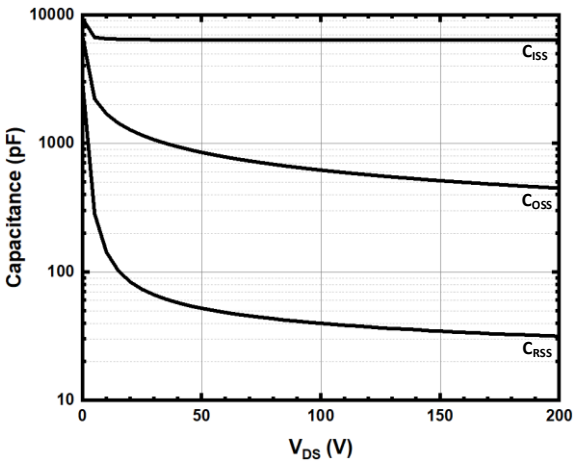


Fig. 17 Capacitances vs V_{DS} (200V)

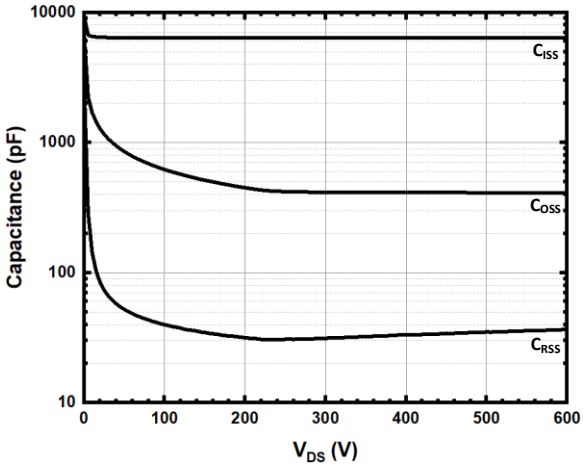


Fig. 18 Capacitances vs V_{DS} (600V)

Typical Performance

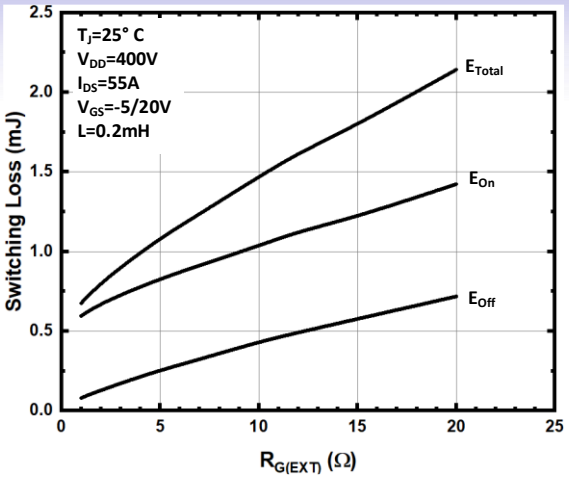


Fig. 19 Switching Loss vs $R_{G(EXT)}$ (400V)

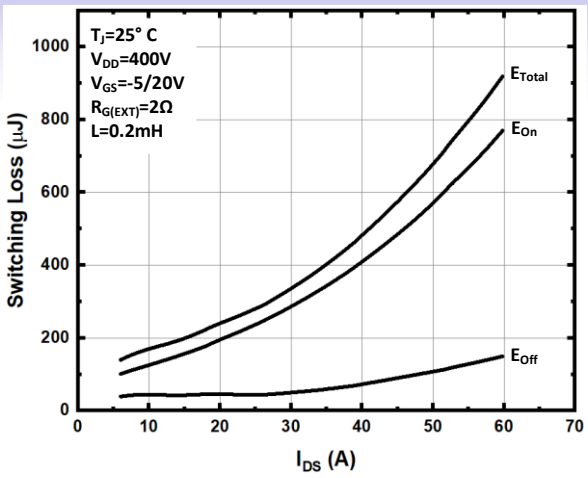


Fig. 20 Switching Loss vs Drain Current (400V)

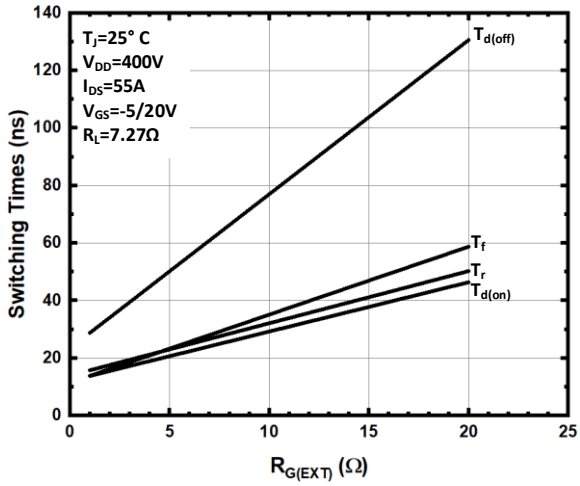


Fig. 21 Switching Time vs $R_{G(EXT)}$

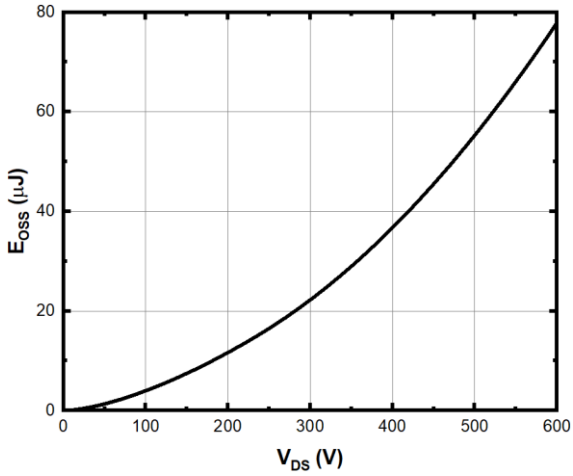


Fig. 22 Output Capacitor Stored Energy

Methodologies

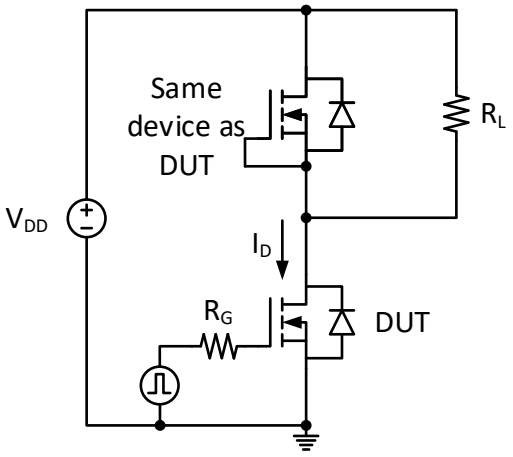


Fig. 23 Resistive Load Switching

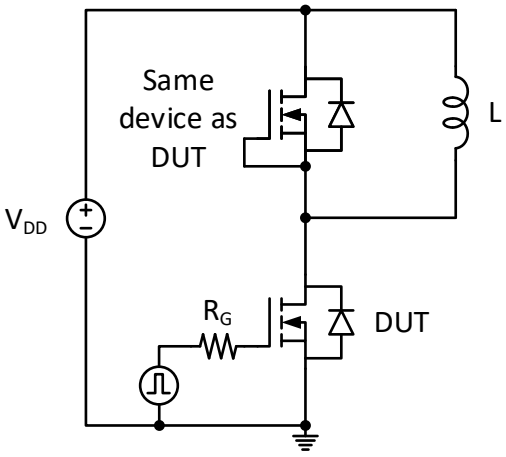


Fig. 24 Clamped Inductive Switching

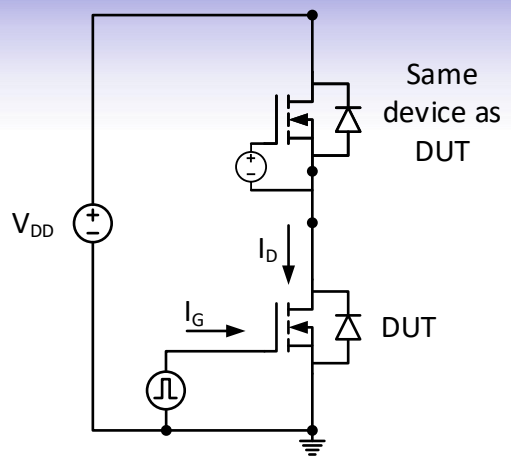


Fig. 25 Gate Charge

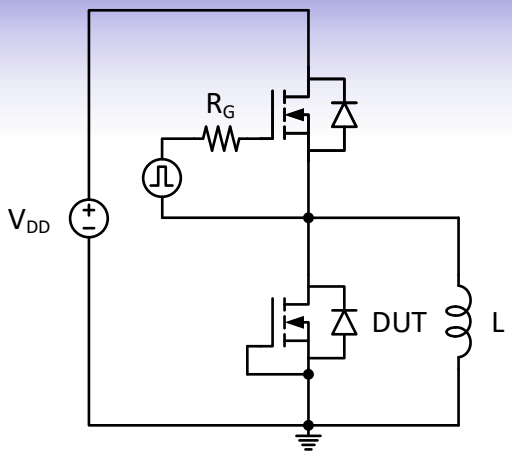


Fig. 26 Body Diode Reverse Recovery

Definitions

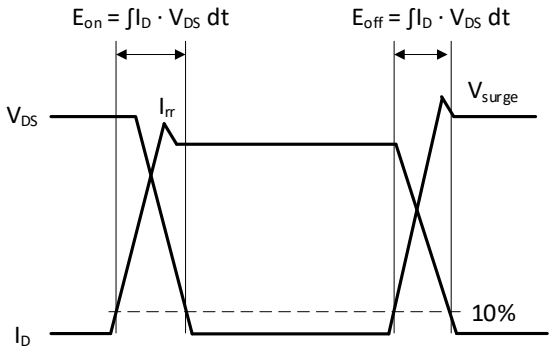


Fig. 27 Switching Losses

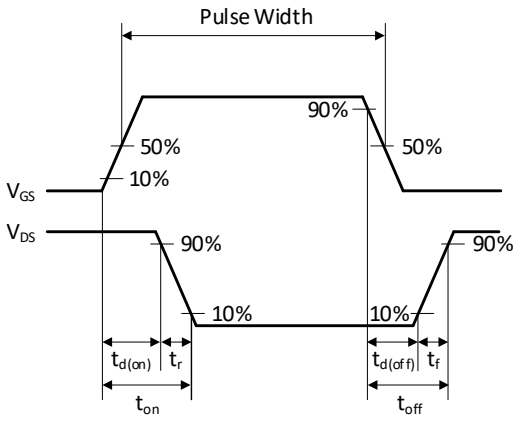


Fig. 28 Switching Times

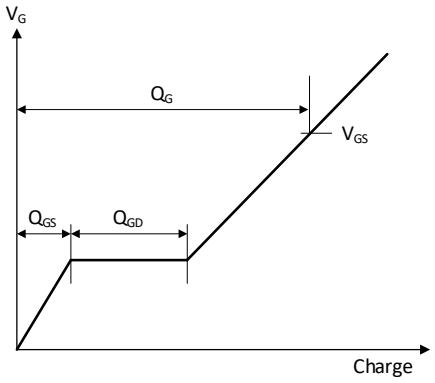


Fig. 29 Gate Charges

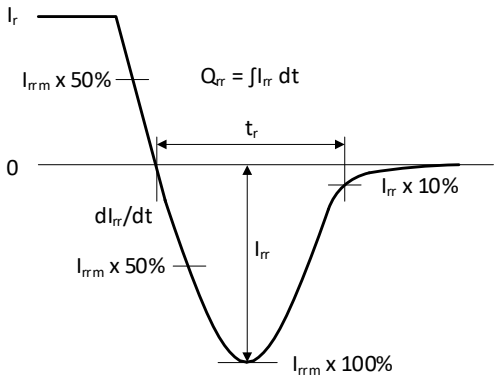
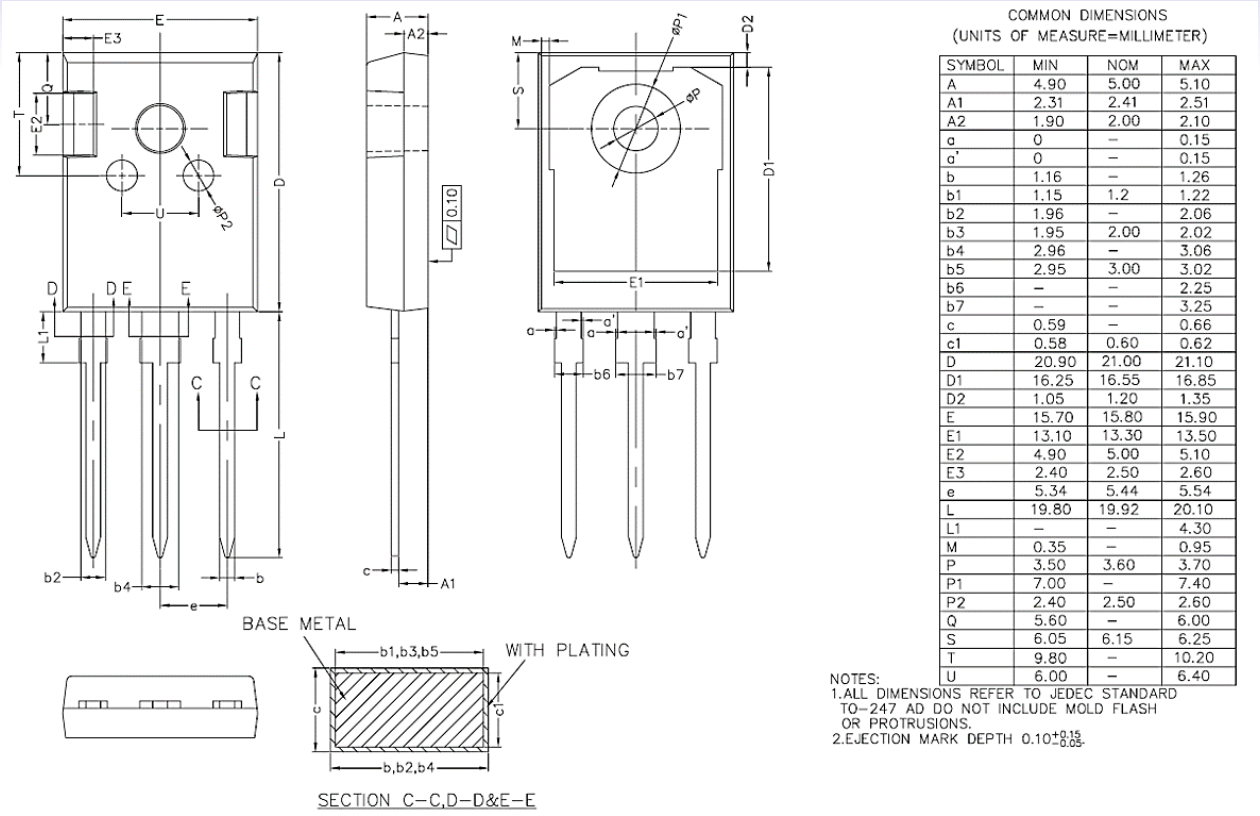


Fig. 30 Body Diode Reverse Recovery

Package TO-247-3 （Unit: mm）



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	4.90	5.00	5.10
A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
a	0	–	0.15
a'	0	–	0.15
b	1.16	–	1.26
b1	1.15	1.2	1.22
b2	1.96	–	2.06
b3	1.95	2.00	2.02
b4	2.96	–	3.06
b5	2.95	3.00	3.02
b6	–	–	2.25
b7	–	–	3.25
c	0.59	–	0.66
c1	0.58	0.60	0.62
D	20.90	21.00	21.10
D1	16.25	16.55	16.85
D2	1.05	1.20	1.35
E	15.70	15.80	15.90
E1	13.10	13.30	13.50
E2	4.90	5.00	5.10
E3	2.40	2.50	2.60
e	5.34	5.44	5.54
L	19.80	19.92	20.10
L1	–	–	4.30
M	0.35	–	0.95
P	3.50	3.60	3.70
P1	7.00	–	7.40
P2	2.40	2.50	2.60
Q	5.60	–	6.00
S	6.05	6.15	6.25
T	9.80	–	10.20
U	6.00	–	6.40

NOTES:
1.ALL DIMENSIONS REFER TO JEDEC STANDARD TO-247 AD DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.
2.EJECTION MARK DEPTH $0.10^{+0.15}_{0.05}$

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Providing A to Z Power Solutions

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