SFB021N40C2

N-MOSFET 40V, 1.6mΩ, 190A

Features

- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Fast switching
- High avalanche current
- Extremely low on-resistance $R_{DS(on)}$

Application

- Brushed and BLDC Motor drive systems
- Battery Management
- DC/DC and AC/DC Converter
- UPS

Product Summary

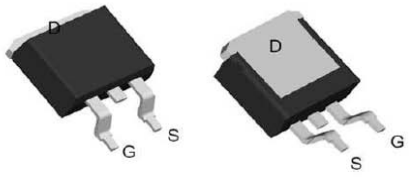
V_{DS}	40V
$R_{DS(on),Typ}$	1.6mΩ
I_D	190A

100% DVDS Tested

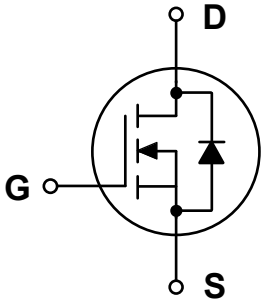
100% Avalanche Tested

RoHS

TO-263



SFB021N40C2



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
SFB021N40C2	021N40C2	TO-263	Reel&Tape	330×24.8mm	24mm	800pcs

Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Drain - Source Voltage		V_{DS}	40	V
Gate - Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_C = 25℃	I_D	190	A
	T_C = 100℃		132	
Pulsed Drain Current(Tc=25℃,t_p limited by T_{jmax})		$I_{D,Pulse}$	760	A
Single Pulsed Avalanche Energy(L=0.5mH,I_{AS}=46A,R_G=25Ω,T_J=25℃)		E_{AS}	506	mJ
Power Dissipation	T_C = 25℃	P_{tot}	208	W
Junction Temperature		T_J	-55 ~ 150	℃
Storage Temperature		T_{STG}	-55 ~ 150	℃

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance , junction – case	R_{thJC}	0.6	℃/W
Thermal resistance , junction – ambient(min. footprint)	R_{thJA}	62.5	℃/W

Electrical Characteristics (T_J = 25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain - Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0V, I_D = 250μA	40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 40V, V_{GS} = 0V T_C=25℃ T_C=100℃	 - -	 - -	 1 100	μA
Gate - Body Leakage Current	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1.0	1.7	2.5	V
Drain-source On-resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 30A	-	1.6	2.1	mΩ
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS} = 20V, V_{GS} = 0V, f = 1MHz	-	11500	-	pF
Output Capacitance	C_{oss}		-	752	-	
Reverse Transfer Capacitance	C_{rss}		-	650	-	
Gate Resistance	R_g	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz	-	2.8	-	Ω
Switching Characteristics						
Total Gate Charge	Q_g	V_{DS} = 20V, V_{GS} = 10V, I_D = 30A	-	150	-	nC
Gate-source Charge	Q_{gs}		-	52	-	
Gate-drain Charge	Q_{gd}		-	28	-	
Turn-on Delay Time	$t_{d(on)}$	V_{DS} = 20V, V_{GS} = 10V,R_G=3Ω	-	31	-	ns
Turn-on Rise Time	t_r		-	36	-	
Turn-off Delay Ttime	$t_{d(off)}$		-	72	-	
Turn-off Fall Time	t_f		-	25	-	

Body Diode Characteristic

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Diode continous forward current	I_S	-	-	-	190	A
Diode pulse current	$I_{S,pulse}$	Pulsed, tp ≤ 10 μs	-	-	760	A
Body Diode Forward Voltage	V_{SD}	V_{GS} = 0V,I_{SD} = 30A	-	-	1.2	V
Body Diode Reverse Recovery Time	T_{rr}	I_F=30A,di/dt=100A/μs	-	30	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}	I_F=30A,di/dt=100A/μs	-	23	-	nC

Typical Performance Characteristics

Figure 1: Power De-rating

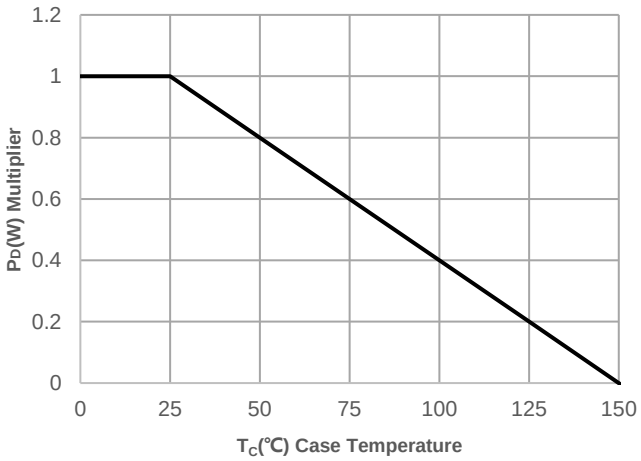


Figure 2: Current De-rating

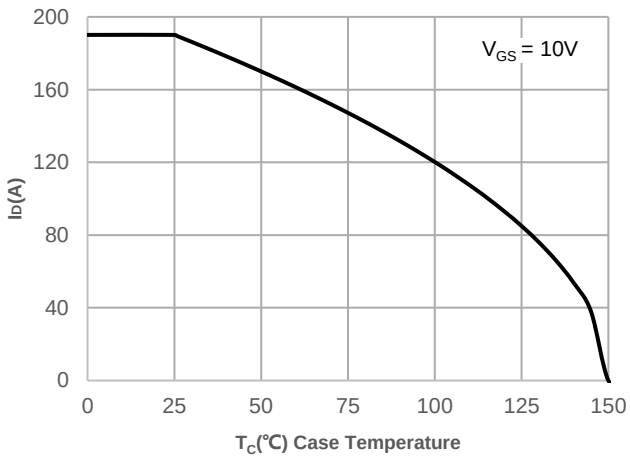


Figure 3: Normalized Maximum Transient Thermal Impedance

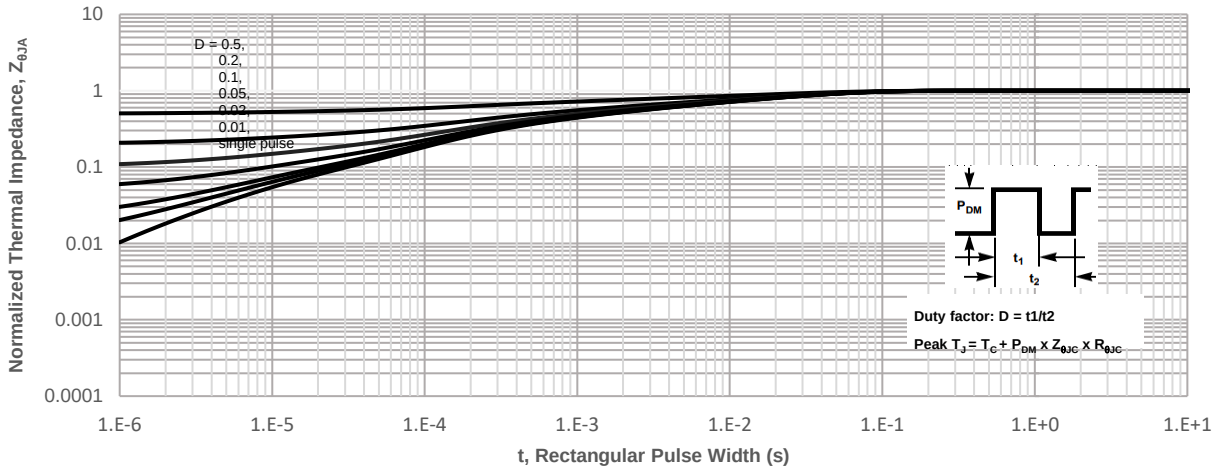


Figure 4: Peak Current Capacity

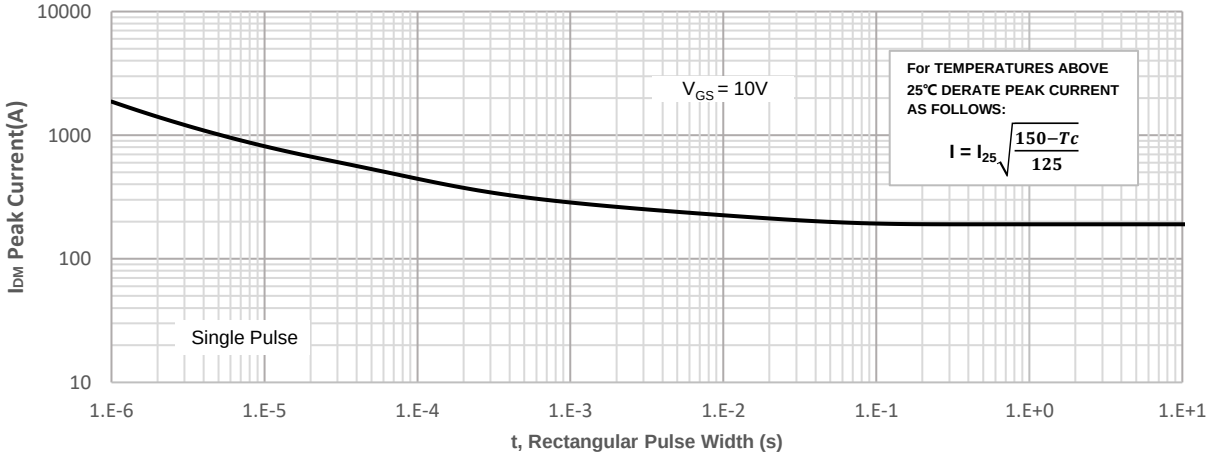


Figure 5: Output Characteristics

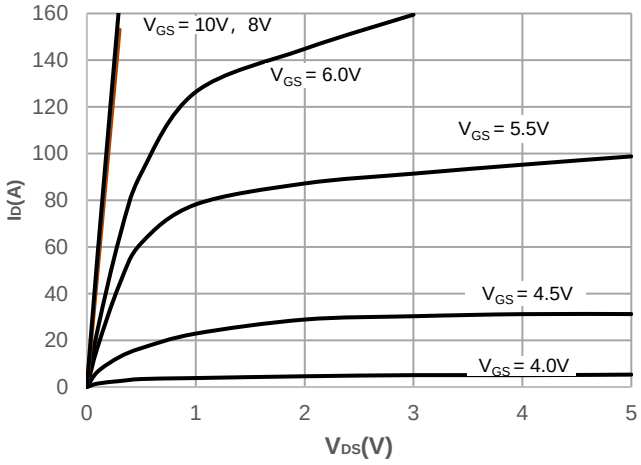


Figure 6: Typical Transfer Characteristics

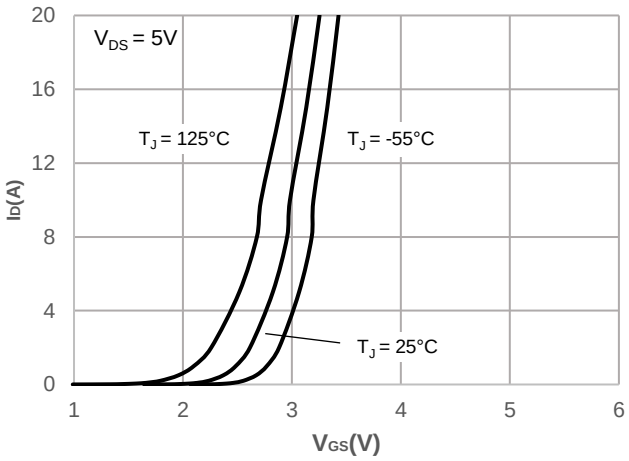


Figure 7: On-resistance vs. Drain Current

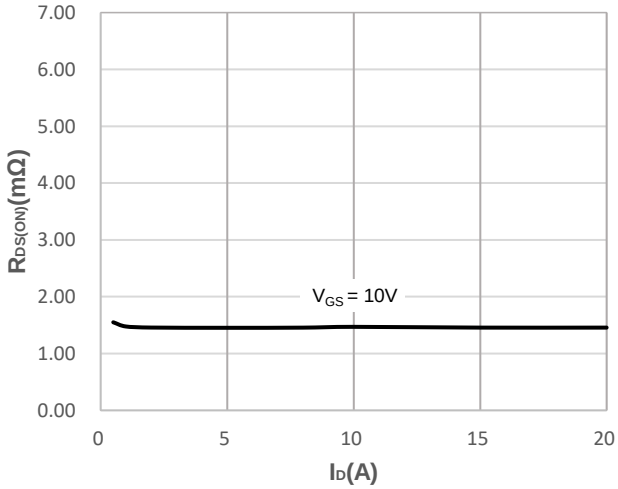


Figure 8: Body Diode Characteristics

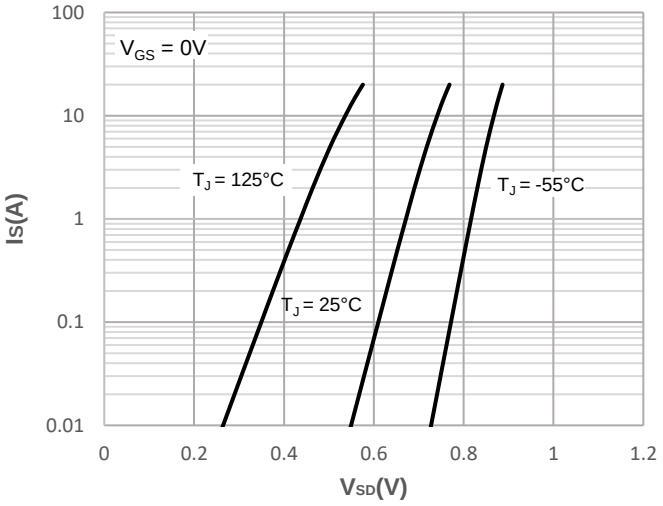


Figure 9: Gate Charge Characteristics

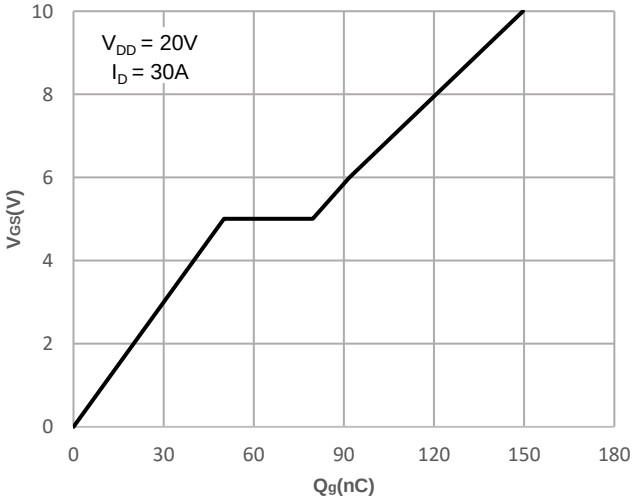


Figure 10: Capacitance Characteristics

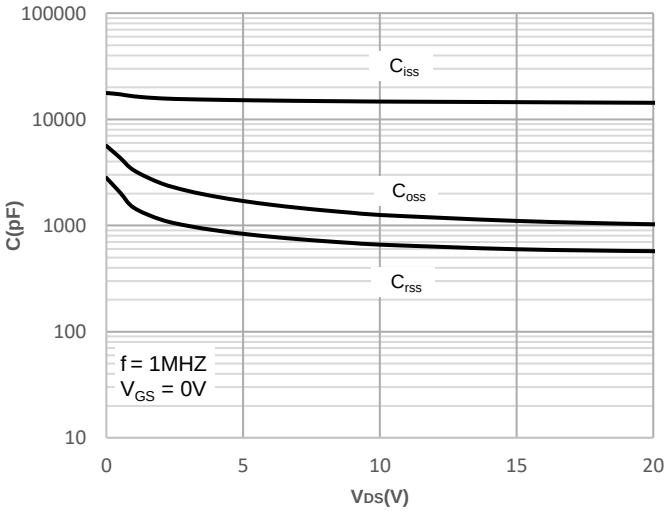


Figure 11: Normalized Breakdown voltage vs. Junction Temperature

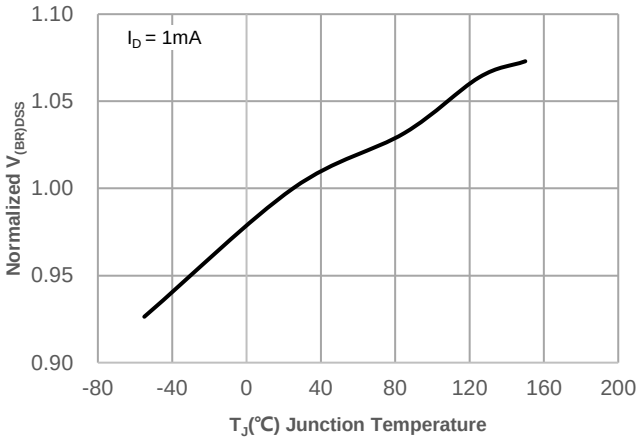


Figure 12: Normalized on Resistance vs. Junction Temperature

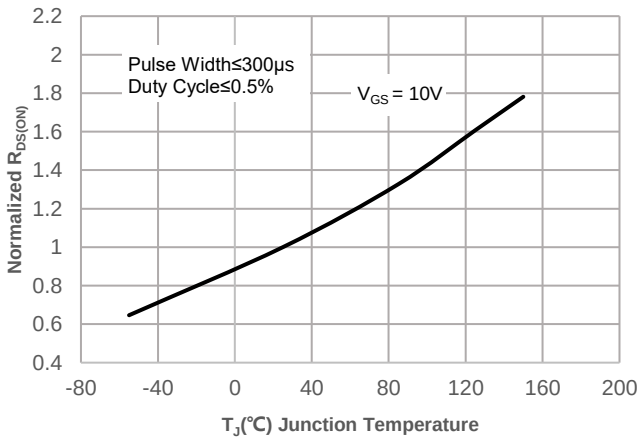


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

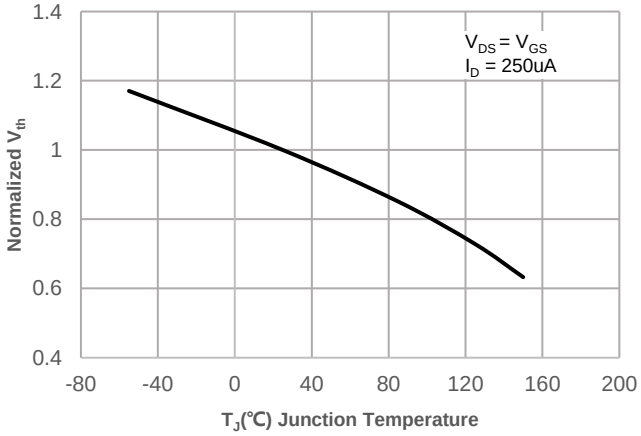


Figure 14: $R_{DS(ON)}$ vs. V_{GS}

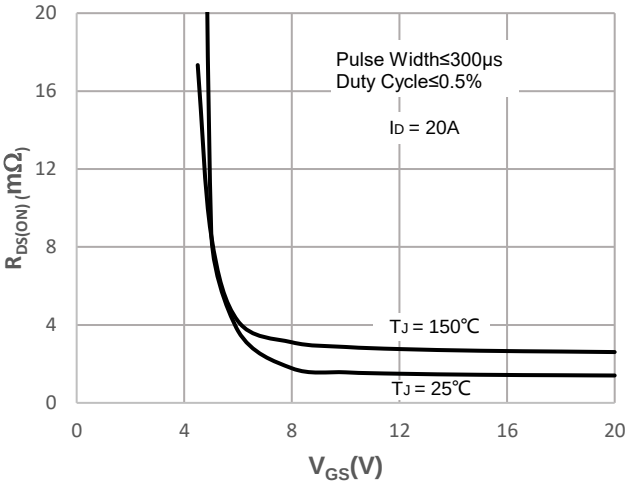
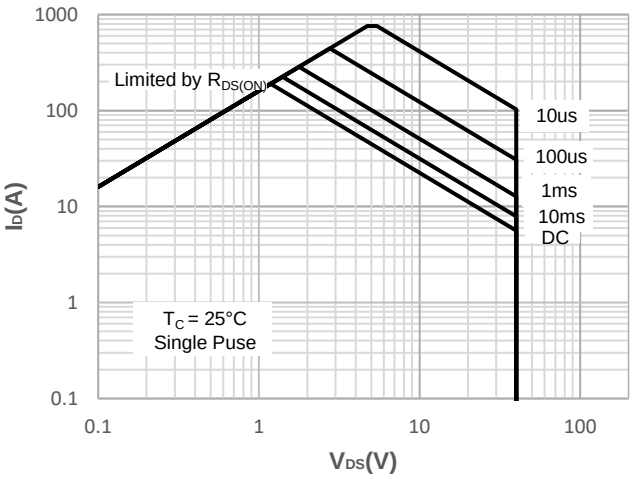
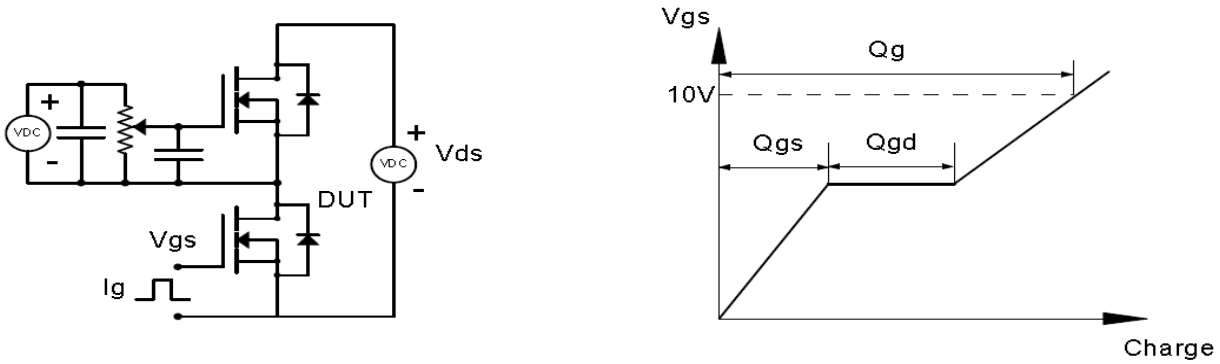


Figure 15: Maximum Safe Operating Area

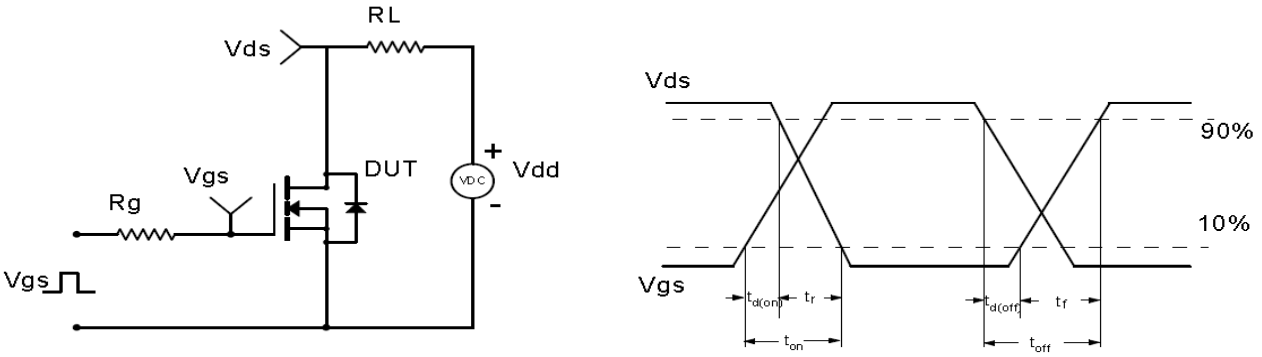


Test Circuit & Waveform

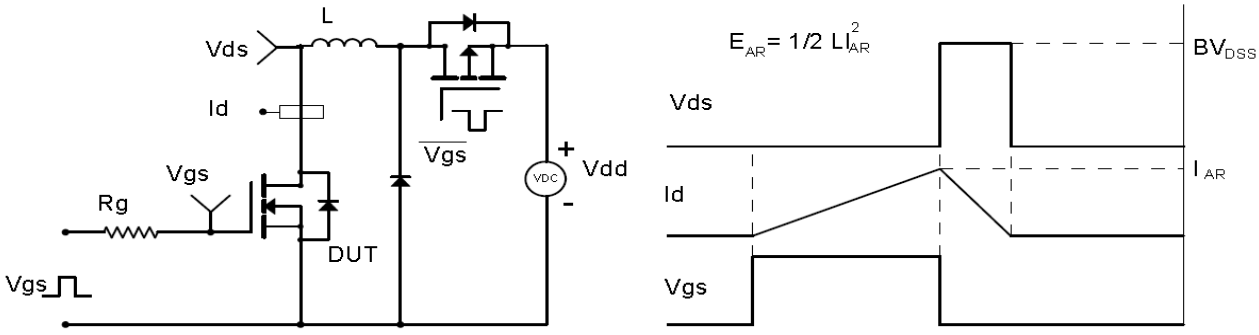
Gate Charge Test Circuit & Waveform



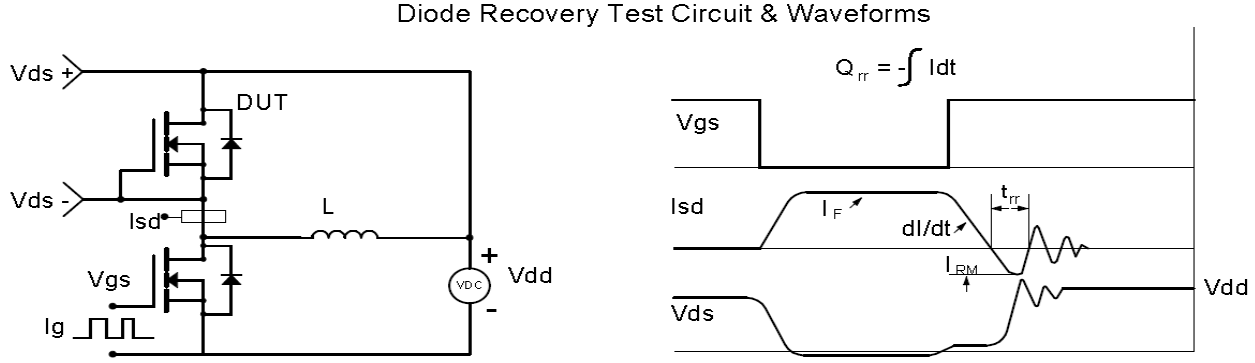
Resistive Switching Test Circuit & Waveforms



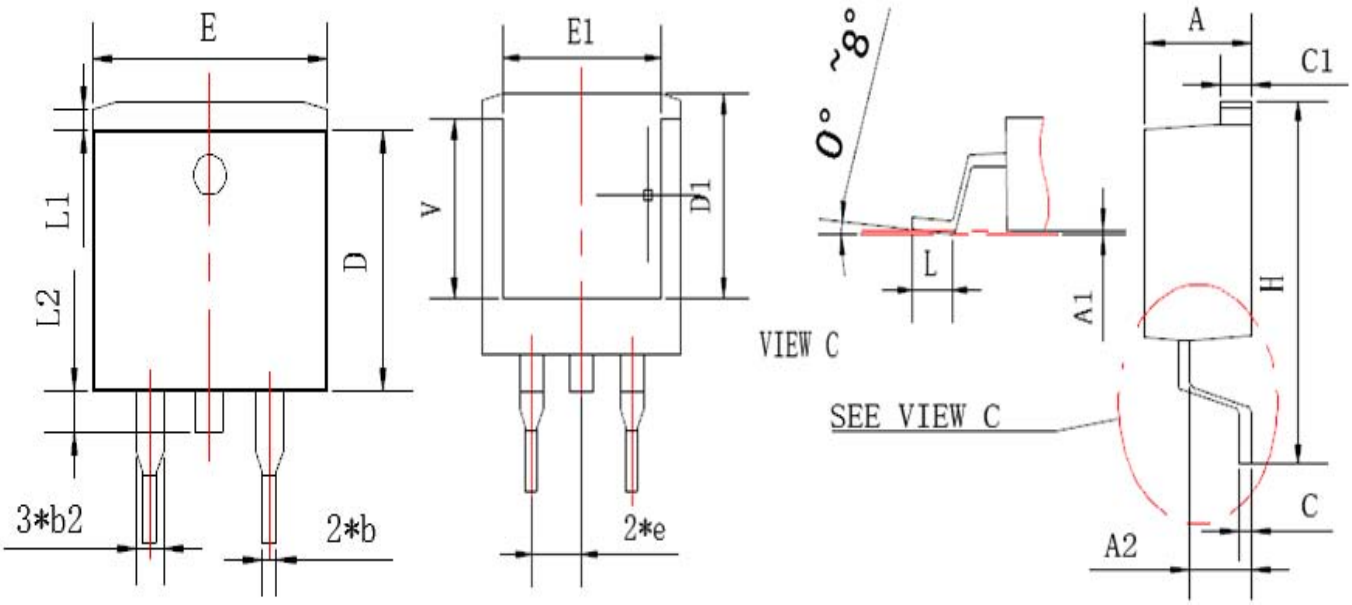
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: TO-263



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.30	4.80	0.169	0.189
A1	0.00	0.25	0.000	0.010
A2	2.35	2.70	0.093	0.106
b	0.70	0.94	0.028	0.037
b2	1.15	1.35	0.045	0.053
C	0.35	0.65	0.014	0.026
C1	1.20	1.40	0.047	0.055
D	8.40	9.40	0.331	0.370
D1	7.80	8.10	0.307	0.319
e	2.540 Typ.		0.100 Typ.	
E	9.85	10.30	0.388	0.406
E1	7.00	8.50	0.276	0.335
H	15.00	15.70	0.591	0.618
L	2.30	2.80	0.091	0.110
L1	0.90	1.30	0.035	0.051
V	6.700Ref.		0.264Ref	
L2	1.00	1.50	0.039	0.059

Revision History

Revision	Date	Major Changes
1.0	2023-11-21	Release of formal version

Disclaimer

Unless otherwise specified in the datasheet, the product is designed and qulified as a standard commercial product and is not intended for use in applications that require extraordinary levels of quality and reliability, such as automotive, aviation/aerospace and life-support devices or systems.

Any and all semicondutor products have certain probability to fail or malfunction, which may result in personal injury, death or property damage. Customer are solely responsible for providing adequate safe measures when design their systems.

Scilicon Electric reserves the right to improve product design,function and reliability without notice.