

Features

- Low on resistance
- Low gate charge
- Fast switching
- High avalanche current
- Low reverse transfer capacitances

Application

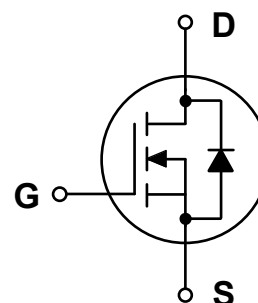
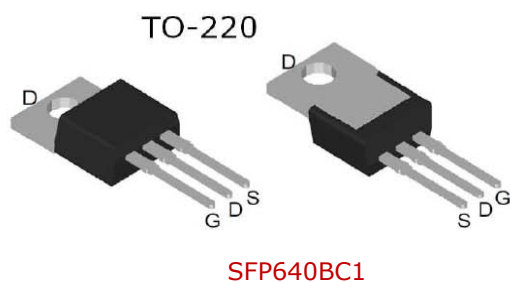
- Brushed and BLDC Motor drive systems
- DC/DC and AC/DC Converter
- UPS

Product Summary

V_{DS}	200V
$R_{DS(on)}$ typ.	0.13Ω
I_D	20A

100% DVDS Tested

100% Avalanche Tested



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
SFP640BC1	640BC1	TO-220	Tube	N/A	N/A	50pcs

Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Drain - Source Voltage		V _{DS}	200	V
Gate - Source Voltage		V _{GS}	±20	V
Continuous Drain Current	T _C = 25°C	I _D	20	A
	T _C = 100°C		14	
Pulsed Drain Current(T _c =25°C,t _p limited by T _{jmax})		I _{D,Pulse}	80	A
Single Pulsed Avalanche Energy(L=0.5mH,I _{AS} =33A,R _G =25Ω,T _J =25°C)		E _{AS}	272	mJ
Power Dissipation	T _C = 25°C	P _{tot}	134.4	W
Junction Temperature		T _J	-55 ~ 150	°C
Storage Temperature		T _{STG}	-55 ~ 150	°C

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance , junction – case	R_{thJC}	0.93	°C/W
Thermal resistance , junction – ambient(min. footprint)	R_{thJA}	62.5	°C/W

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

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
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Static Characteristics

Drain - Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	200	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 200V, V_{GS} = 0V$ $T_C = 25^{\circ}\text{C}$ $T_C = 100^{\circ}\text{C}$	- -	- -	1 250	μA
Gate - Body Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	-	4.0	V
Drain-source On-resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 9A$	-	0.13	0.15	Ω

Dynamic Characteristics

Input Capacitance	C_{iss}	$V_{DS} = 25V, V_{GS} = 0V, f = 1\text{MHz}$	-	1136	-	pF
Output Capacitance	C_{oss}		-	172	-	
Reverse Transfer Capacitance	C_{rss}		-	35	-	

Switching Characteristics

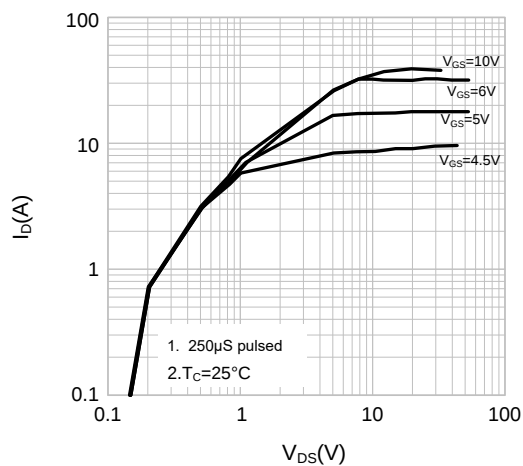
Total Gate Charge	Q_g	$V_{DS} = 160V, V_{GS} = 10V, I_D = 11A$	-	43	-	nC
Gate-source Charge	Q_{gs}		-	6.5	-	
Gate-drain Charge	Q_{gd}		-	19	-	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 100V, V_{GS} = 10V, I_D = 11A,$ $R_G = 2.5\Omega$	-	17	-	ns
Turn-on Rise Time	t_r		-	45	-	
Turn-off Delay Time	$t_{d(off)}$		-	102	-	
Turn-off Fall Time	t_f		-	35	-	

Body Diode Characteristic

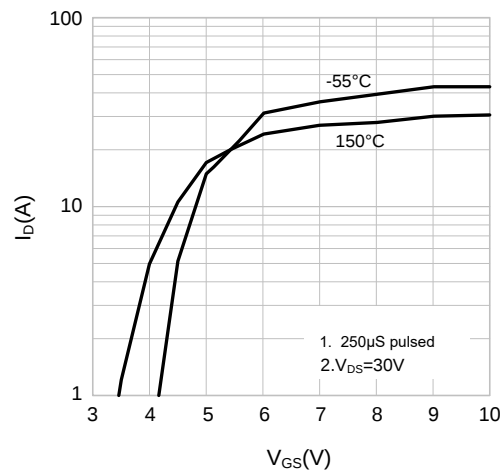
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Diode continuous forward current	I_S	-	-	-	20	A
Diode pulse current	$I_{S,pulse}$	Pulsed, $t_p \leq 10\mu s$	-	-	80	A
Body Diode Forward Voltage	V_{SD}	$V_{GS} = 0V, I_{SD} = 11A$	-	-	1.5	V
Body Diode Reverse Recovery Time	T_{rr}	$I_F = 11A, di/dt = 100A/\mu s$	-	158	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}	$I_F = 11A, di/dt = 100A/\mu s$	-	985	-	nC

Typical Performance Characteristics

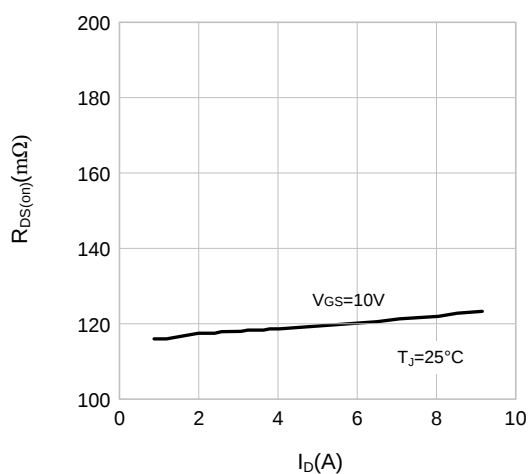
Output Characteristics



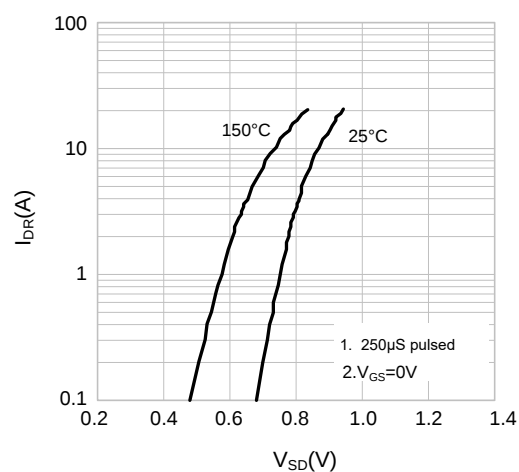
Transfer Characteristics



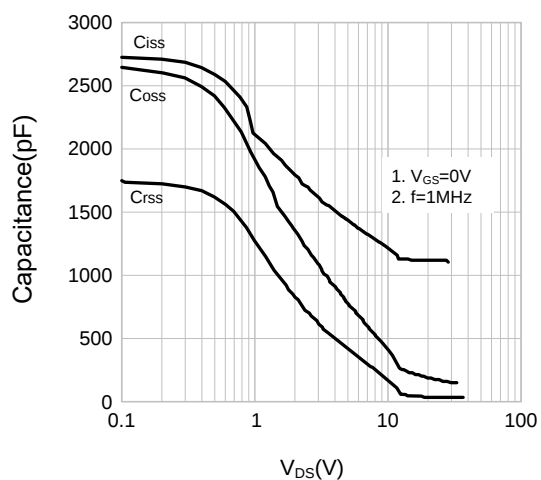
$R_{DS(on)}$ vs Drain Current



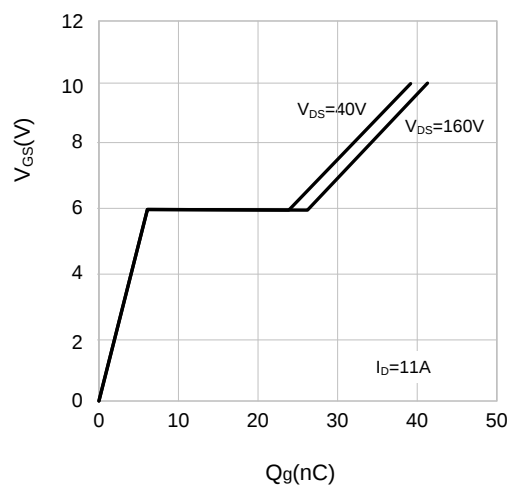
Body-diode Forward Characteristics

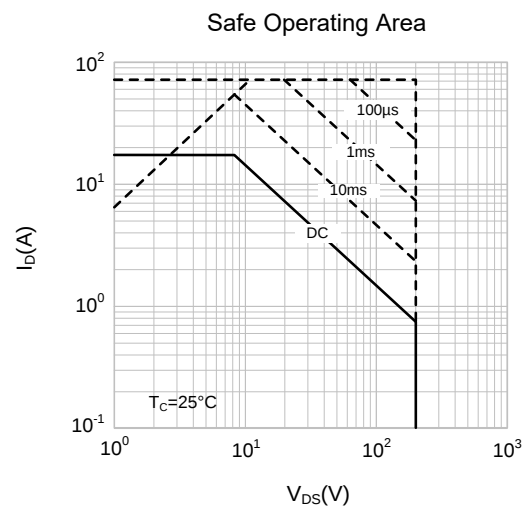
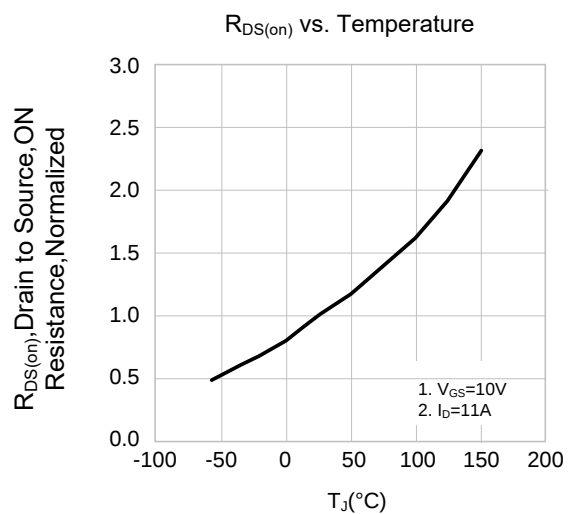


Capacitance Characteristics



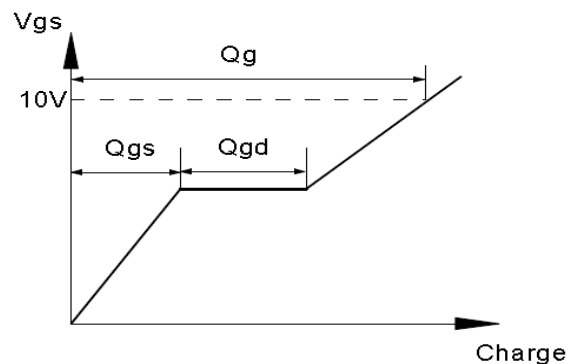
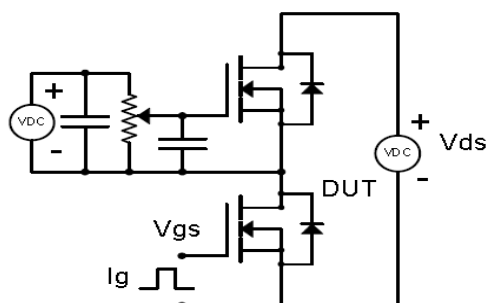
Gate Charge Characteristics



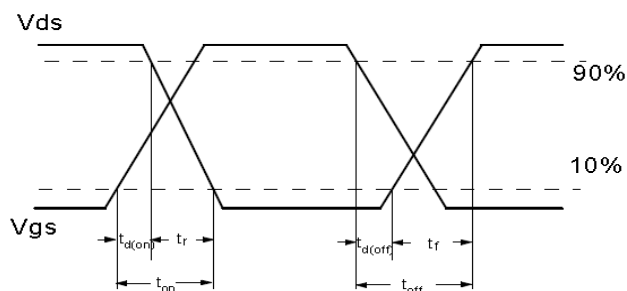
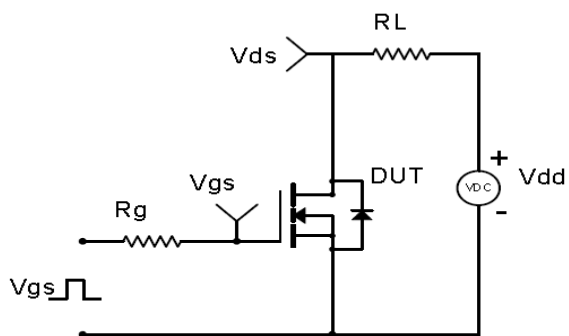


Test Circuit & Waveform

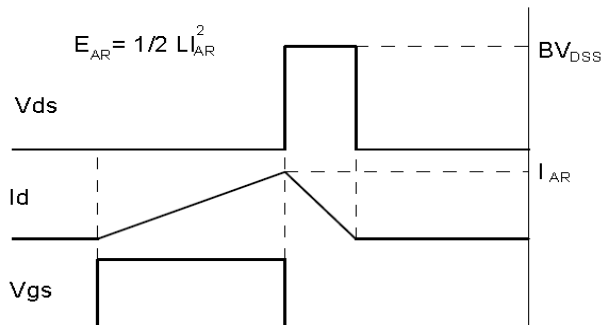
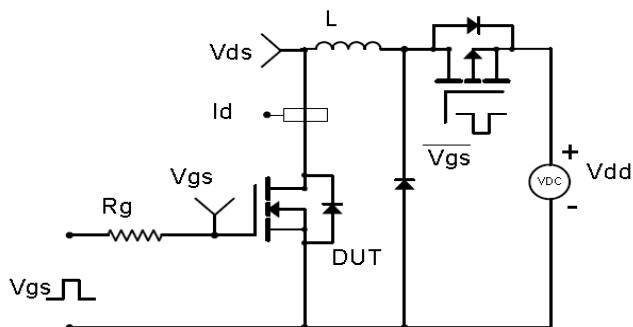
Gate Charge Test Circuit & Waveform



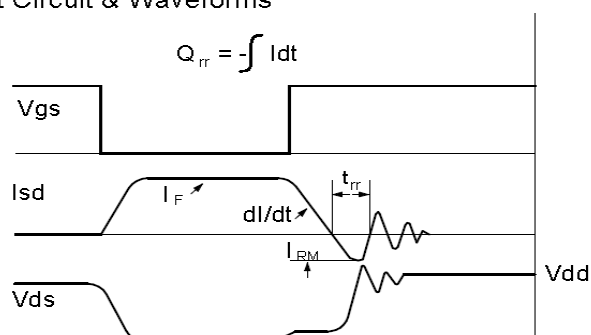
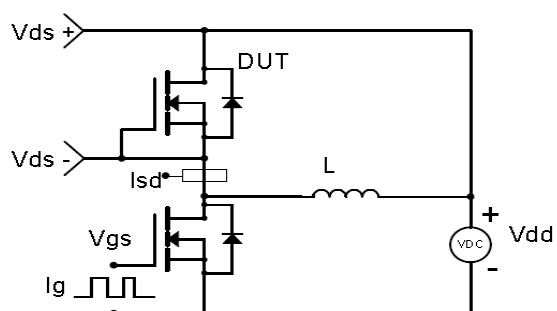
Resistive Switching Test Circuit & Waveforms

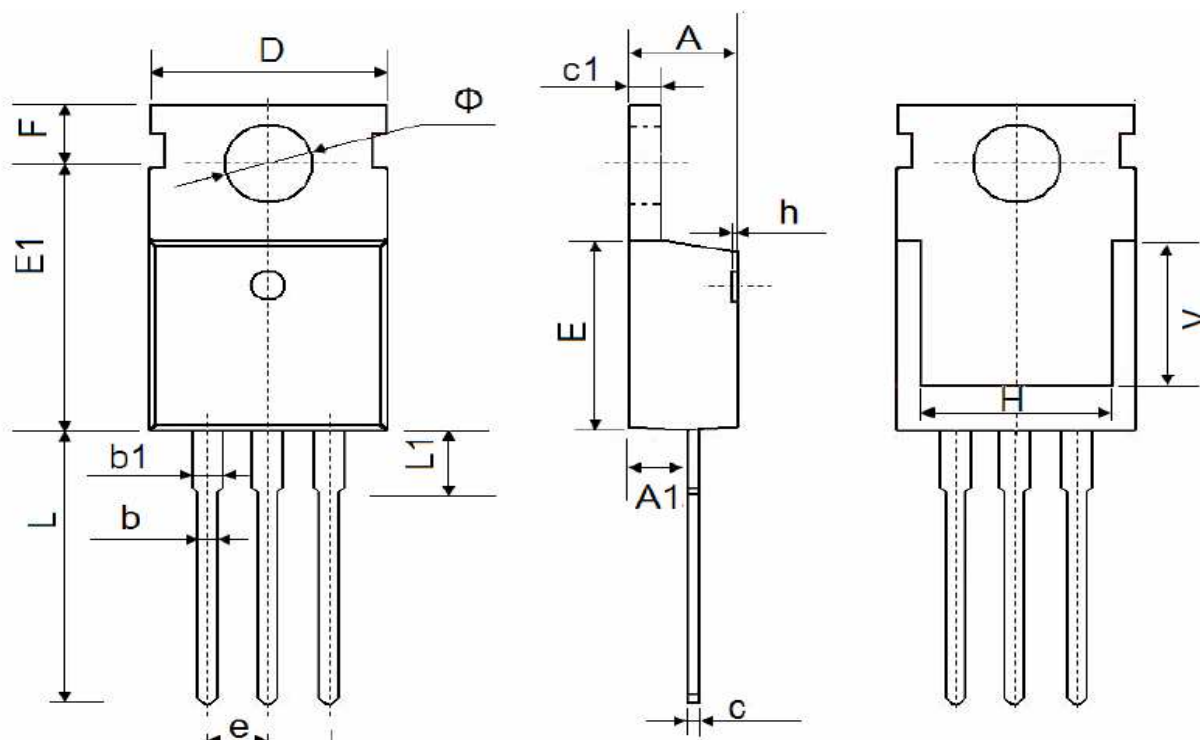


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: TO-220-3L


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.30	4.80	0.169	0.189
A1	2.20	2.70	0.087	0.106
b	0.70	0.95	0.276	0.037
b1	1.10	1.50	0.043	0.059
c	0.40	0.65	0.016	0.026
c1	1.20	1.45	0.047	0.057
D	9.70	10.30	0.382	0.406
E	8.75	9.65	0.344	0.380
E1	12.50	13.10	0.492	0.516
e	2.540 Typ.		0.100 Typ.	
e1	4.98	5.18	0.196	0.204
F	2.60	3.00	0.102	0.118
H	7.00	8.40	0.276	0.331
h	0	0.3	0	0.012
L	12.75	13.90	0.502	0.547
L1	2.85	3.40	0.112	0.134
V	6.700Ref.		0.264Ref.	
Φ	3.50	3.80	0.138	0.150

Revision History

Revision	Date	Major Changes
1.0	2023-9-5	Release of formal version

Disclaimer

Unless otherwise specified in the datasheet, the product is designed and qualified 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 semiconductor 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.