

Features

- Extremely low on-resistance $R_{DS(on)}$
- Qualified according to JEDEC criteria
- Fast switching

Product Summary

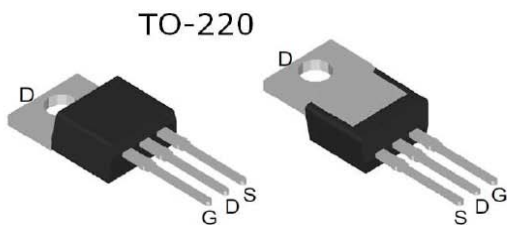
V_{DS}	80V
$R_{DS(on)}$ typ.	1.9mΩ
I_D	120A

Applications

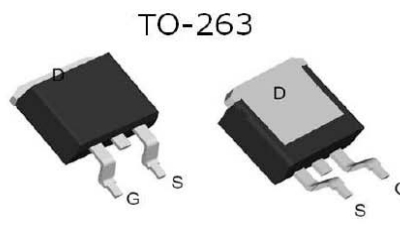
- Motor control and drive
- General purpose applications

100% DVDS Tested

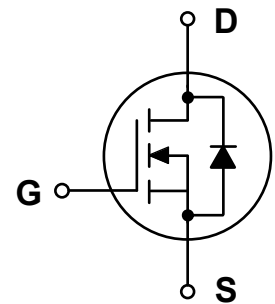
100% Avalanche Tested



SFP024N80C3



SFB021N80C3



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
SFP024N80C3	024N80C3	TO-220	Tube	N/A	N/A	50pcs
SFB021N80C3	021N80C3	TO-263	Reel&Tape	330×24.8mm	24mm	800pcs

Absolute Maximum Ratings ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristics		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	80	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current ⁽¹⁾	$T_C=25^\circ\text{C}$ (Silicon Limited)	I_D	230	A
	$T_C=25^\circ\text{C}$ (Package Limited)		120	
	$T_C=100^\circ\text{C}$ (Silicon Limited)		198	
Pulsed Drain Current ⁽³⁾		I_{DM}	720	
Power Dissipation	$T_C=25^\circ\text{C}$	P_D	230	W
	$T_C=100^\circ\text{C}$		90	
Single Pulse Avalanche Energy ⁽²⁾		E_{AS}	722	mJ
Junction and Storage Temperature Range		T_J, T_{stg}	-55~175	$^\circ\text{C}$

Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient ⁽¹⁾	$R_{\theta JA}$	60	°C/W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.5	

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

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D = 250\mu\text{A}, V_{GS} = 0\text{V}$	80.0	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	2.3	3.0	3.7	
Drain Cut-Off Current	I_{DSS}	$V_{DS} = 80\text{V}, V_{GS} = 0\text{V}$	-	-	1	μA
Gate Leakage Current	I_{GSS}	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$	-	-	±100	nA
Drain-Source ON Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{V}, I_D = 100\text{A}$ TO-220 TO-263	-	1.9	2.4	mΩ
			-	1.8	2.1	
Forward Transconductance	g_{fs}	$V_{DS} = 10\text{V}, I_D = 100\text{A}$	-	130	-	S
Dynamic Characteristics						
Total Gate Charge	Q_g	$V_{DS} = 40\text{V}, I_D = 100\text{A}, V_{GS} = 10\text{V}$	-	167	-	nC
Gate-Source Charge	Q_{gs}		-	49.5	-	
Gate-Drain Charge	Q_{gd}		-	34.5	-	
Input Capacitance	C_{iss}	$V_{DS} = 25\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$	-	12100	-	pF
Reverse Transfer Capacitance	C_{rss}		-	100	-	
Output Capacitance	C_{oss}		-	2100	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10\text{V}, V_{DS} = 40\text{V}, I_D = 100\text{A}, R_G = 3.0\Omega$	-	33.9	-	nS
Rise Time	t_r		-	19.5	-	
Turn-Off Delay Time	$t_{d(off)}$		-	142.5	-	
Fall Time	t_f		-	49.2	-	
Gate Resistance	R_g	$f = 1\text{MHz}$	-	2.7	-	Ω
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V_{SD}	$I_S = 100\text{A}, V_{GS} = 0\text{V}$	-	0.9	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = 100\text{A}, dI/dt = 100\text{A}/\mu\text{s}$	-	TBD	-	nS
Body Diode Reverse Recovery Charge	Q_{rr}		-	TBD	-	nC

Note :

1. Surface mounted FR-4 board by JEDEC (jesd51-7). Continuous current at $T_C = 25^\circ\text{C}$ is silicon limited
2. E_{AS} is tested at starting $T_J = 25^\circ\text{C}$, $L = 1.0\text{mH}$, $I_{AS} = 38\text{A}$, $V_{GS} = 10\text{V}$.
3. Pulse width limited by T_{Jmax}

Typical Performance Characteristics

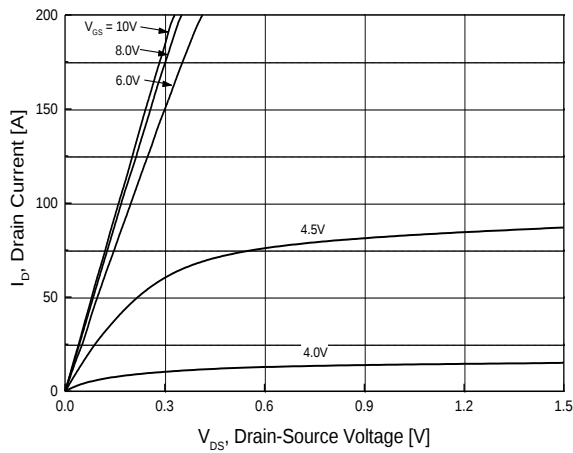


Fig.1 On-Region Characteristics

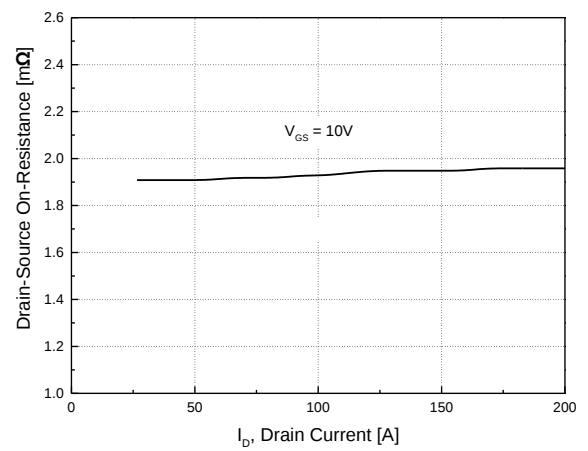


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

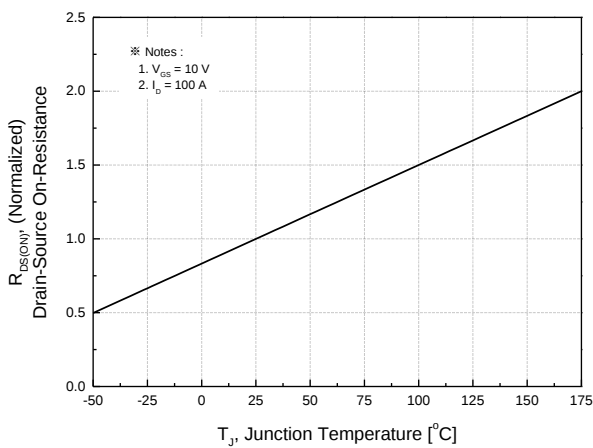


Fig.3 On-Resistance Variation with Temperature

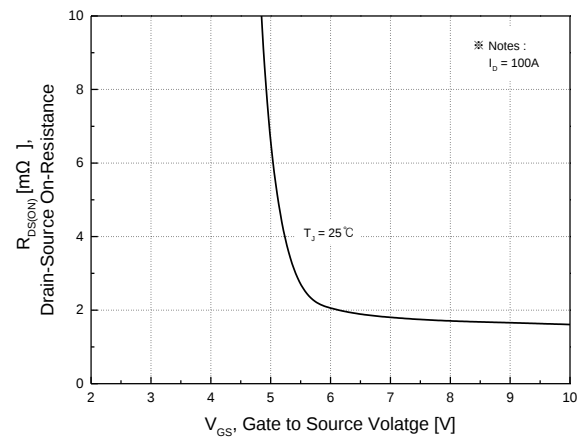


Fig.4 On-Resistance Variation with Gate to Source Voltage

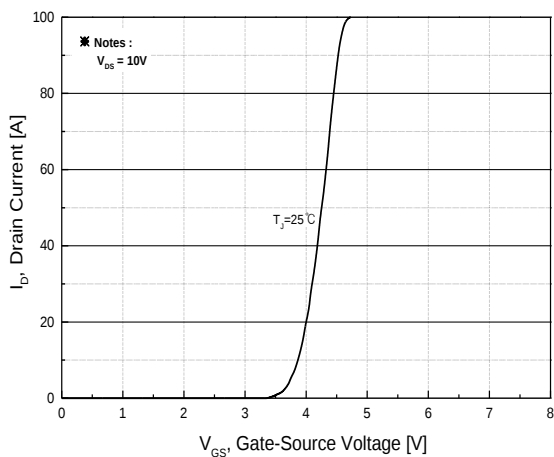


Fig.5 Transfer Characteristics

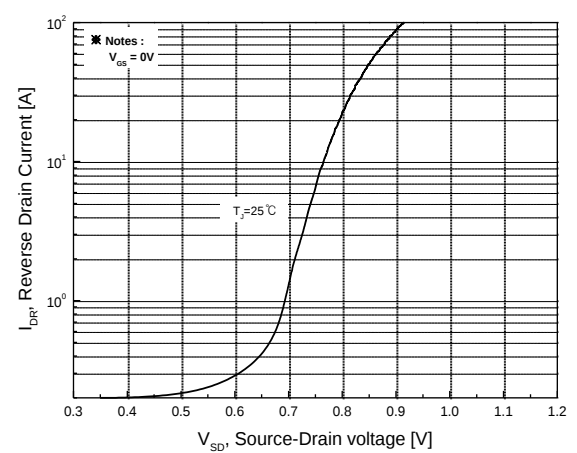


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

Typical Performance Characteristics

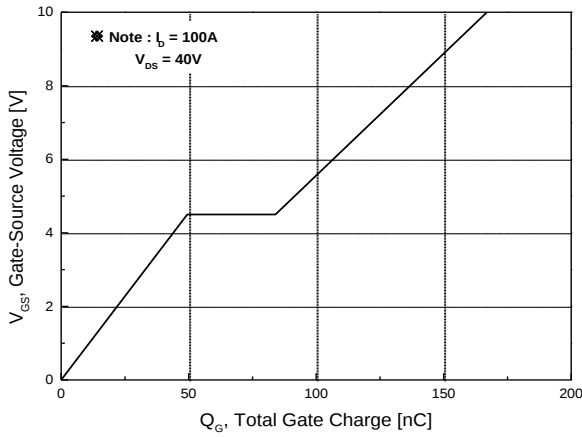


Fig.7 Gate Charge Characteristics

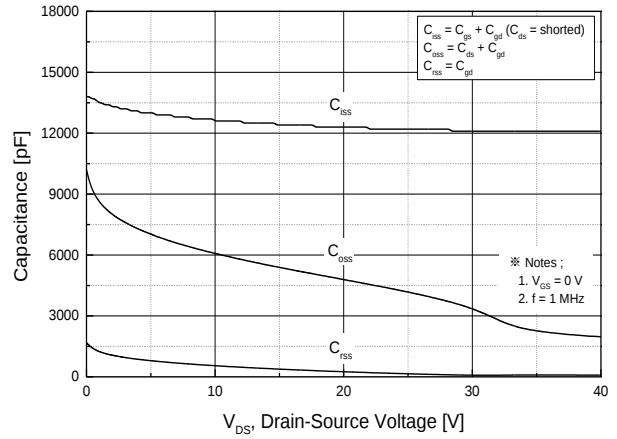


Fig.8 Capacitance Characteristics

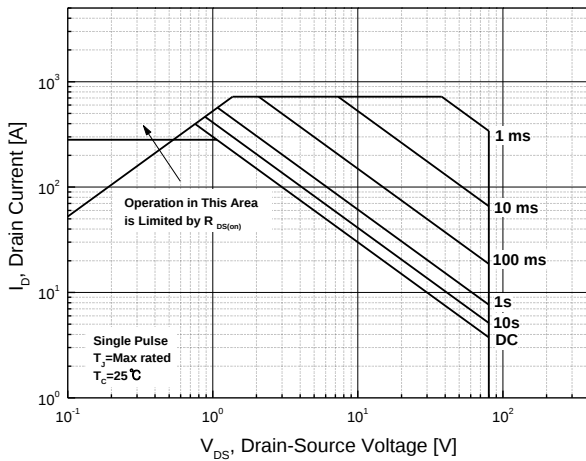


Fig.9 Maximum Safe Operating Area

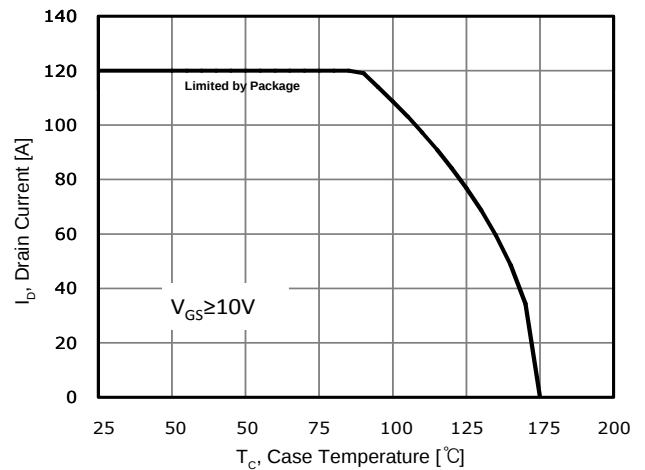


Fig.10 Maximum Drain Current vs. Case Temperature

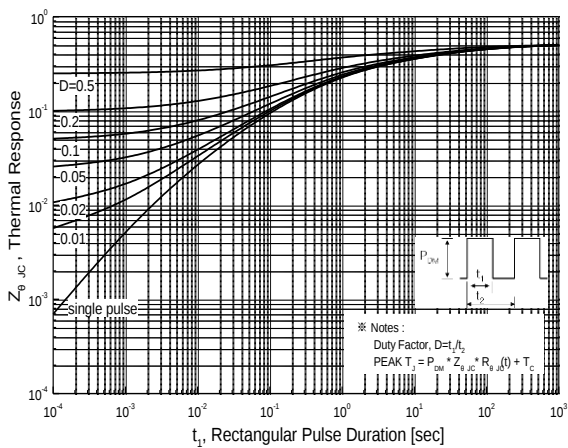
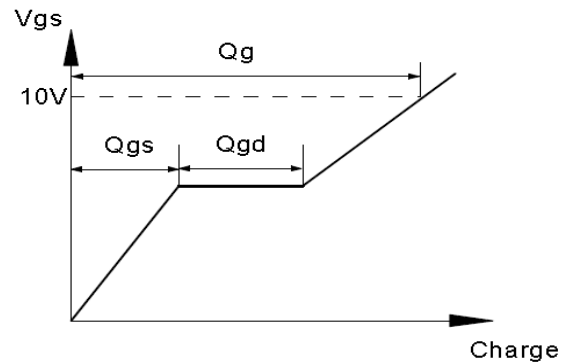
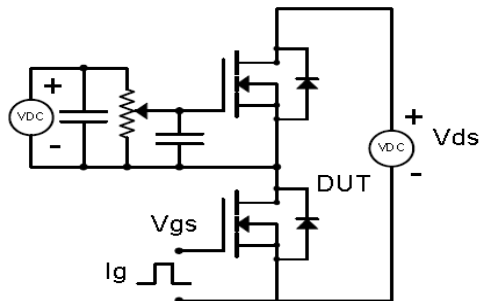


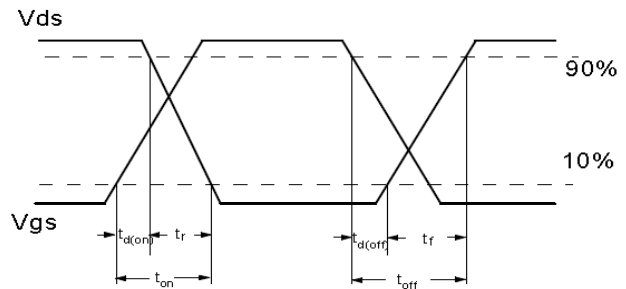
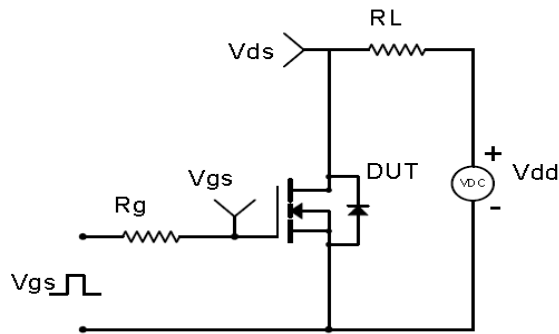
Fig.11 Transient Thermal Response Curve

Test Circuit & Waveform

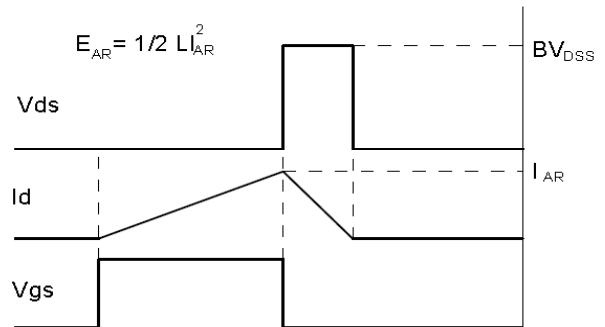
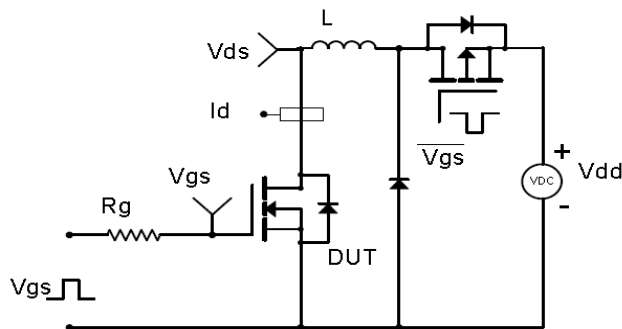
Gate Charge Test Circuit & Waveform



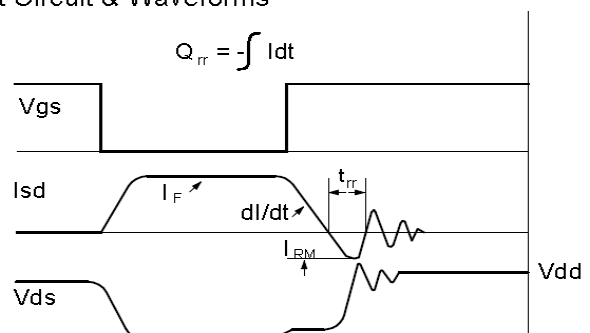
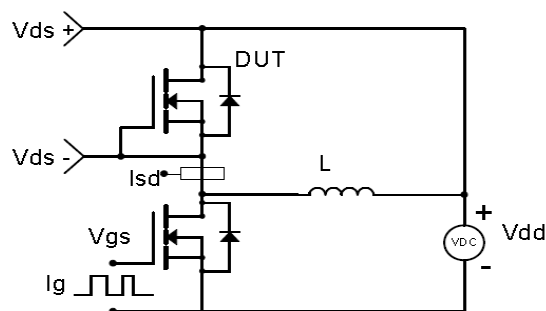
Resistive Switching Test Circuit & Waveforms

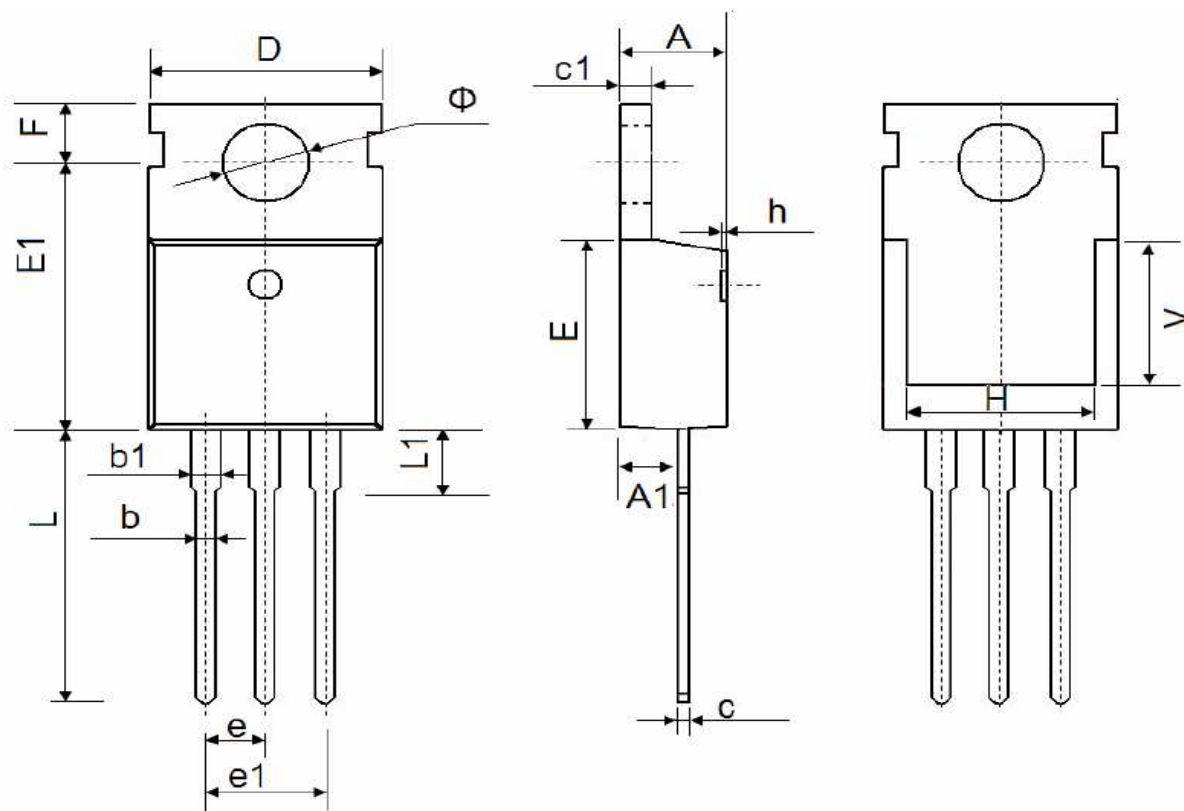


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

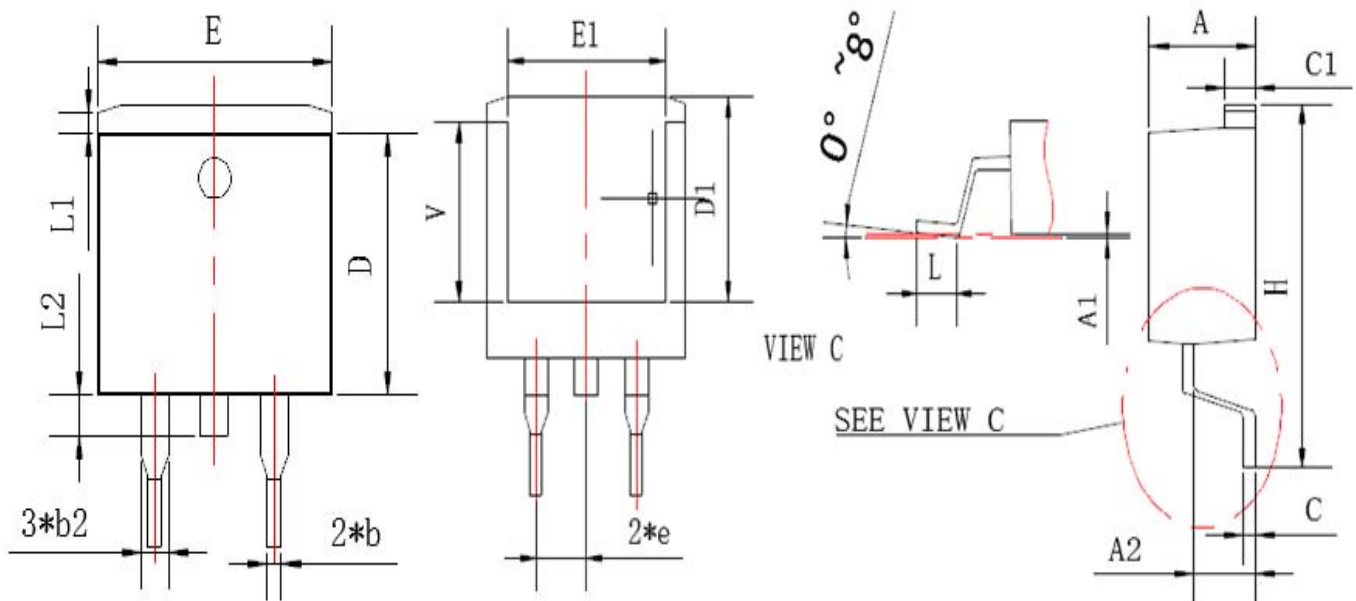


Diode Recovery Test Circuit & Waveforms



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	0.028	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

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	2021-11-30	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.