华润微电子(重庆)有限公司

CRJS190N65GC

SJMOS N-MOSFET 650V, 0.16Ω, 20A

Features

- CRM(CQ) Super_Junction technology
- Much lower Ron*A performance for On-state efficiency
- Better efficiency due to very low FOM

Product Summary

VDS	650V
$R_{DS(on)_typ}$	0.16Ω
I_D	20A

Applications

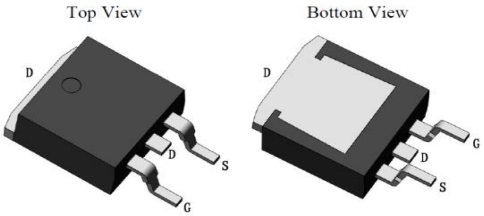
- LED/LCD/PDP TV and monitor Lighting
- Solar/Renewable/UPS-Micro Inverter System
- Charger
- Power Supply

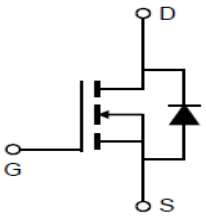
100% DVDS Tested

100% Avalanche Tested

RoHS

H F





Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRJS190N65GC	CRJS190N65GC	TO-263	Tape&Reel	N/A	N/A	1000pcs

Absolute Maximum Ratings

Parameter	**Symbol**	**Value**	**Unit**
Drain-source voltage	V_{DS}	650	V
Continuous drain current[1)] T_C = 25°C T_C = 100°C	I_D	 20 14.0	A
Pulsed drain current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	80	A
Avalanche energy, single pulse (L=60mH, Rg=30Ω)	E_{AS}	320	mJ
MOSFET dv/dt ruggedness	dv/dt	50	V/ns
Gate-Source voltage	V_{GS}	±30	V
Power dissipation (T_C = 25°C)	P_{tot}	235	W
Continuous diode forward current(T_C = 25°C)	I_S	20	A
Diode pulse current [2)] (T_C = 25°C)	$I_{S\ pulse}$	80	A
Recovery diode dv/dt [3)]	dv/dt	50	V/ns
Operating junction and storage temperature	T_j , T_{stg}	-55...+150	°C

1) Limited by Tj,max. Maximum Duty Cycle D = 0.50
2) Pulse width tp limited by Tj,max
3) Identical low side and high side switch with identical RG

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Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal resistance, junction – case. Max	R_{thJC}	0.53	°C/W
Thermal resistance, junction – ambient. Max	R_{thJA}	100	

Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristic						
Drain-source breakdown voltage	BV_{DSS}	650	-	-	V	V_{GS}=0V, I_D=250uA
Gate threshold voltage	$V_{GS(th)}$	3.2	3.7	4.2	V	V_{DS}=V_{GS},I_D=250uA
Zero gate voltage drain current	I_{DSS}	- -	- 20	1 -	μA	V_{DS}=650V,V_{GS}=0V T_C=25°C T_C=150°C
Gate-source leakage current	I_{GSS}	-	0.3	80	nA	V_{GS}=±30V,V_{DS}=0V
Drain-source on-state resistance	$R_{DS(on)}$	- -	0.16 0.43	0.19 -	Ω	V_{GS}=10V, I_D=10A, T_C=25°C T_C=150°C
Transconductance	g_{fs}	-	24	-	S	V_{DS}=20V,I_D=10A
Dynamic Characteristic						
Input Capacitance	C_{iss}	-	1787	-	pF	V_{GS}=0V, V_{DS}=100V, f=1MHz
Output Capacitance	C_{oss}	-	65	-		
Reverse Transfer Capacitance	C_{rss}	-	2.4	-		
Gate Total Charge	Q_G	-	49	-	nC	V_{GS}=10V, V_{DS}=480V, I_D=10A, f=1MHz
Gate-Source charge	Q_{gs}	-	11.5	-		
Gate-Drain charge	Q_{gd}	-	20	-		
Gate-Drain charge	$V_{plateau}$	-	6	-	V	
Turn-on delay time	$t_{d(on)}$	-	39	-	ns	T_j=25°C, V_{GS}=10V, I_D=10A, V_{DS}=400V, R_g=25Ω
Rise time	t_r	-	26	-		
Turn-off delay time	$t_{d(off)}$	-	156	-		
Fall time	t_f	-	48	-		
Gate resistance	R_G	-	0.9	-	Ω	f=1MHz

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	0.5	0.84	1	V	V_{GS}=0V,I_{SD}=10A
Body Diode Reverse Recovery Time	t_{rr}	-	303	-	ns	Isd=10A dI/dt=100A/us Vds=100V
Body Diode Reverse Recovery Charge	Q_{rr}	-	3.76	-	uC	

Typical Performance Characteristics

Fig 1. Output Characteristics (Tj=25℃)

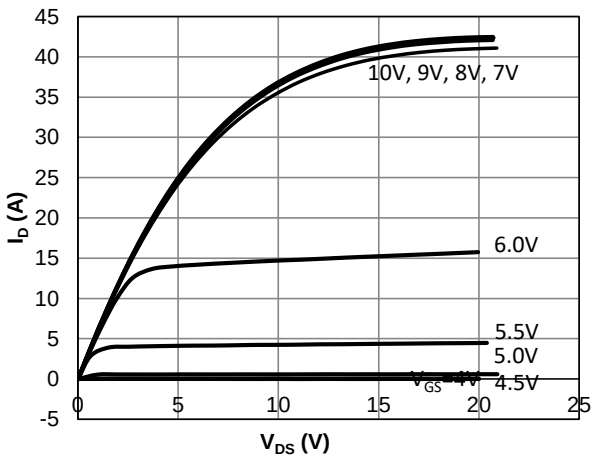


Fig 2. Output Characteristics (Tj=150℃)

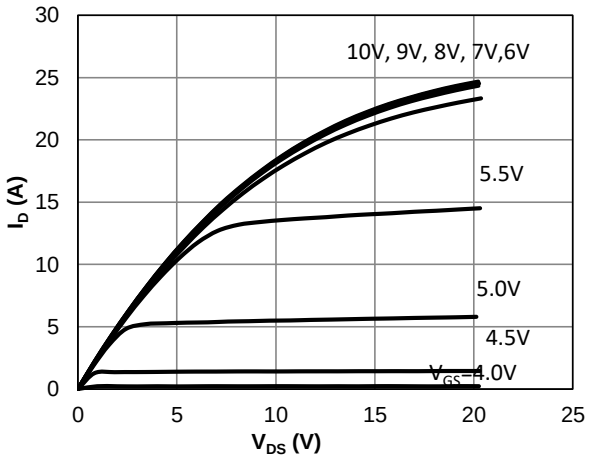


Fig 3: Transfer Characteristics

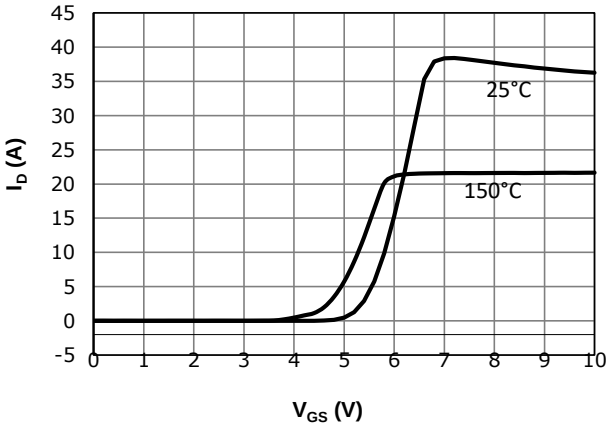


Fig 4: V_{TH} Vs Tj Temperature Characteristics

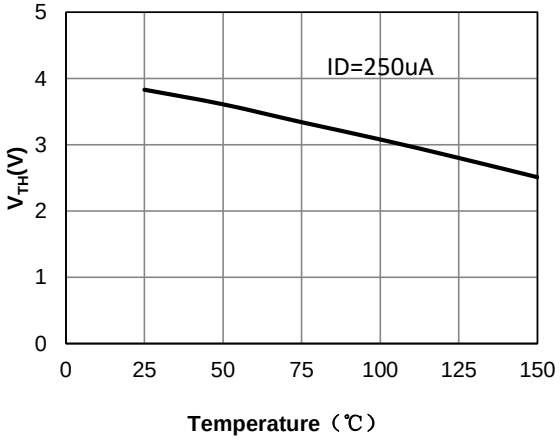


Fig 5: Rdson Vs Ids Characteristics(Tc=25℃)

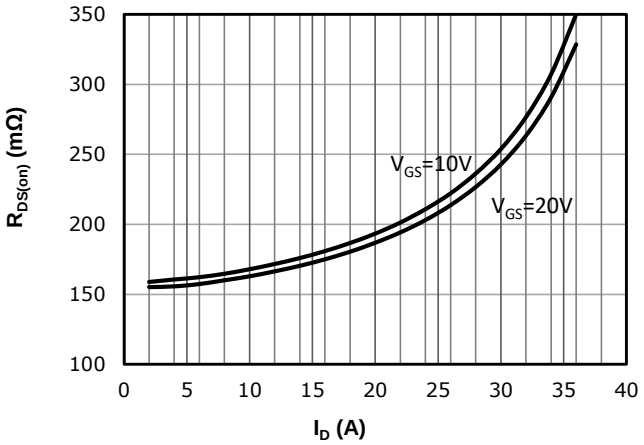


Fig 6: Rds(on) vs. Temperature

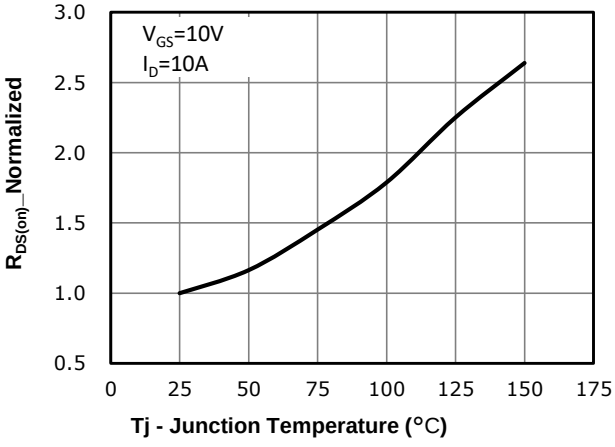


Fig 7: BVDSS vs. Temperature

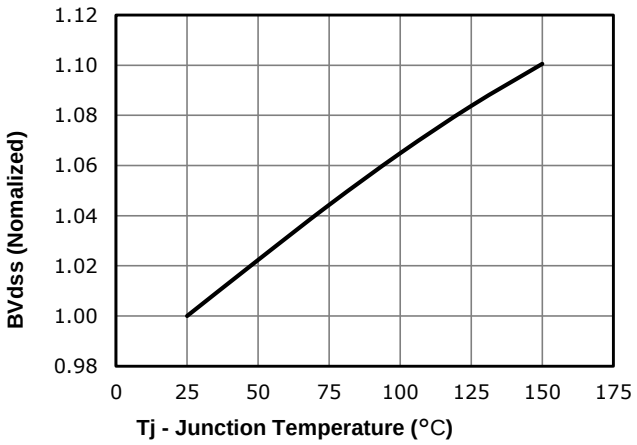


Fig 8: Rds(on) vs Gate Voltage

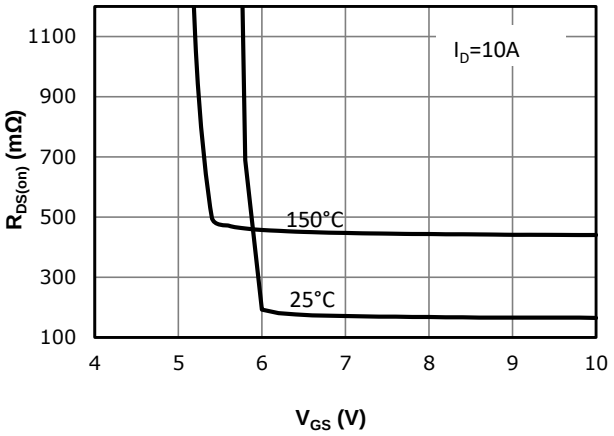


Fig 9: Body-diode Forward Characteristics

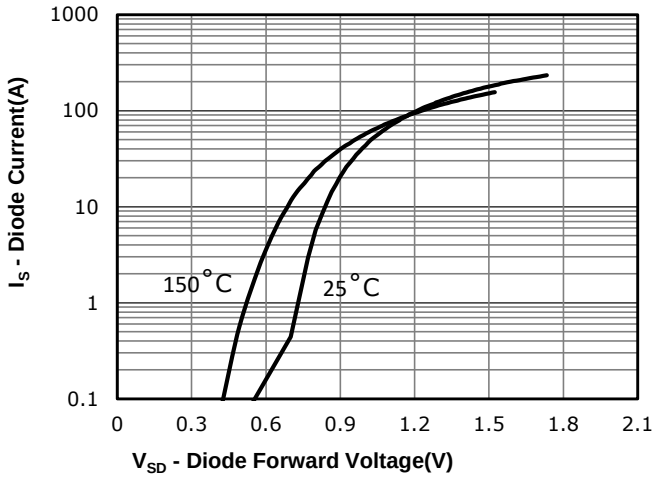


Fig 10: Gate Charge Characteristics

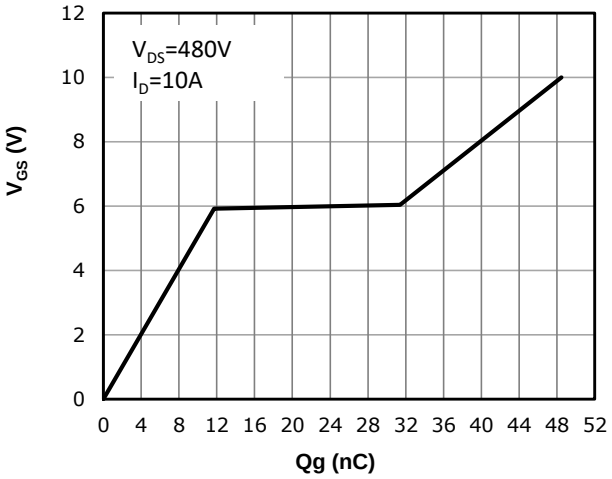


Fig 11: Capacitance Characteristics

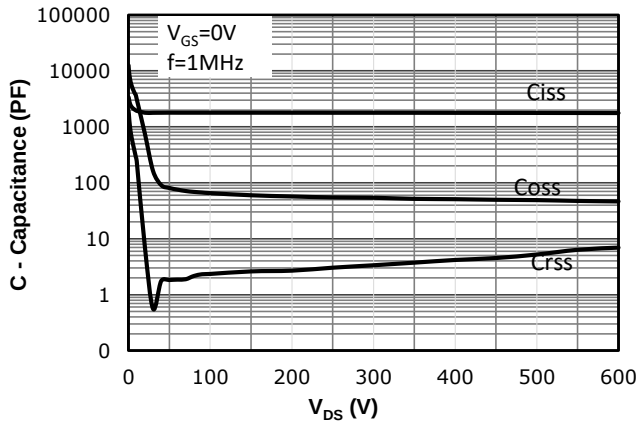


Fig 12: Safe Operating Area

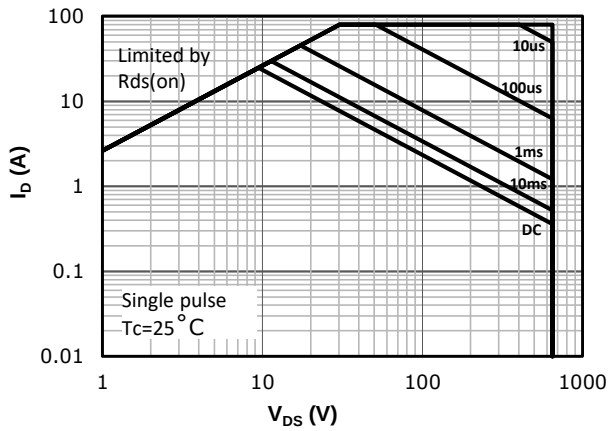
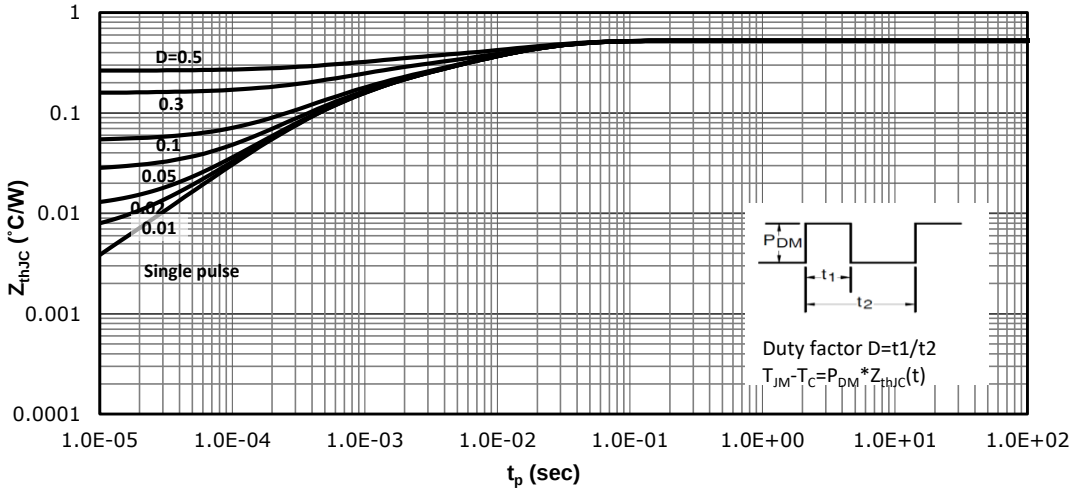
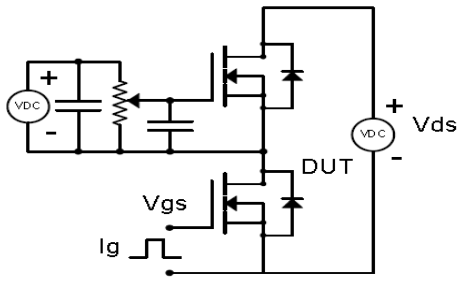


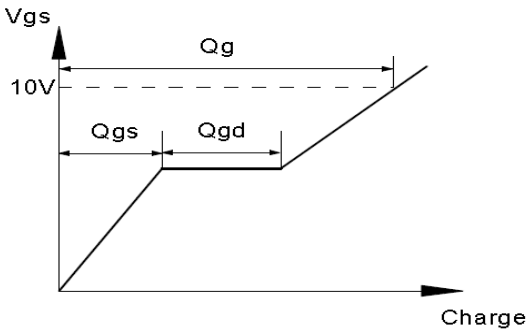
Fig 13: Max. Transient Thermal Impedance



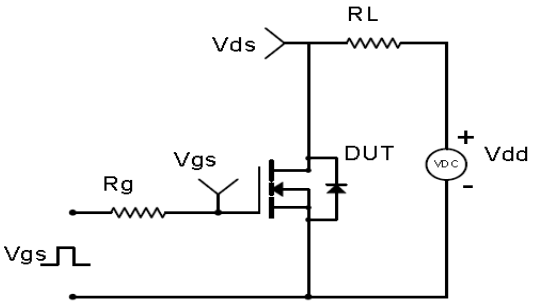
Test Circuit & Waveform

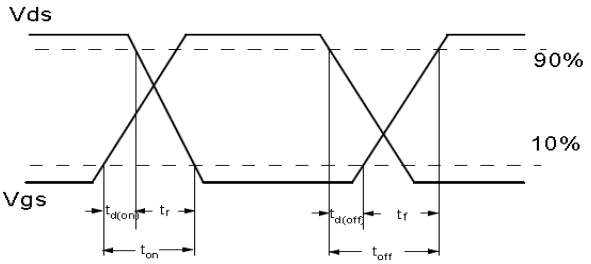
Gate Charge Test Circuit & Waveform



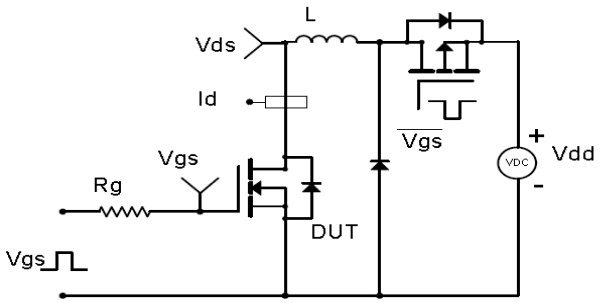


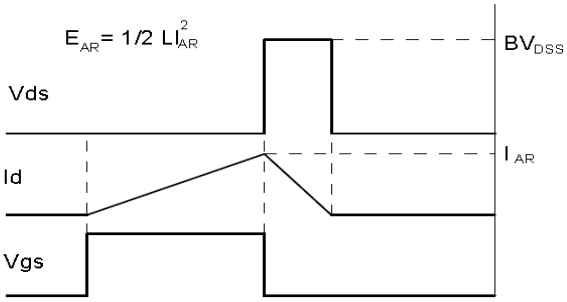
Resistive Switching Test Circuit & Waveforms



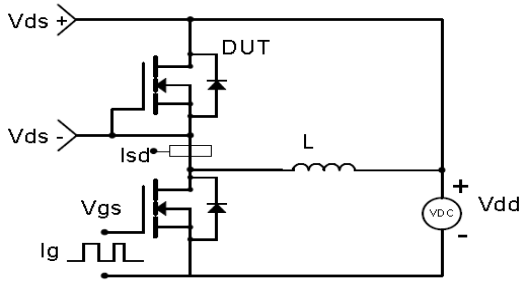


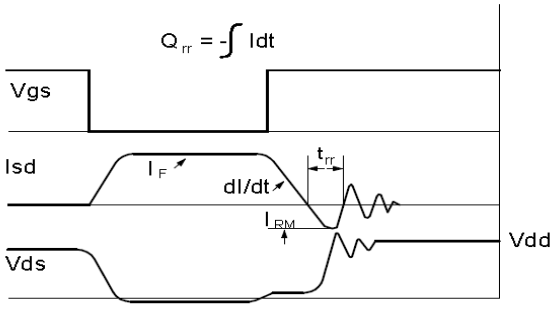
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



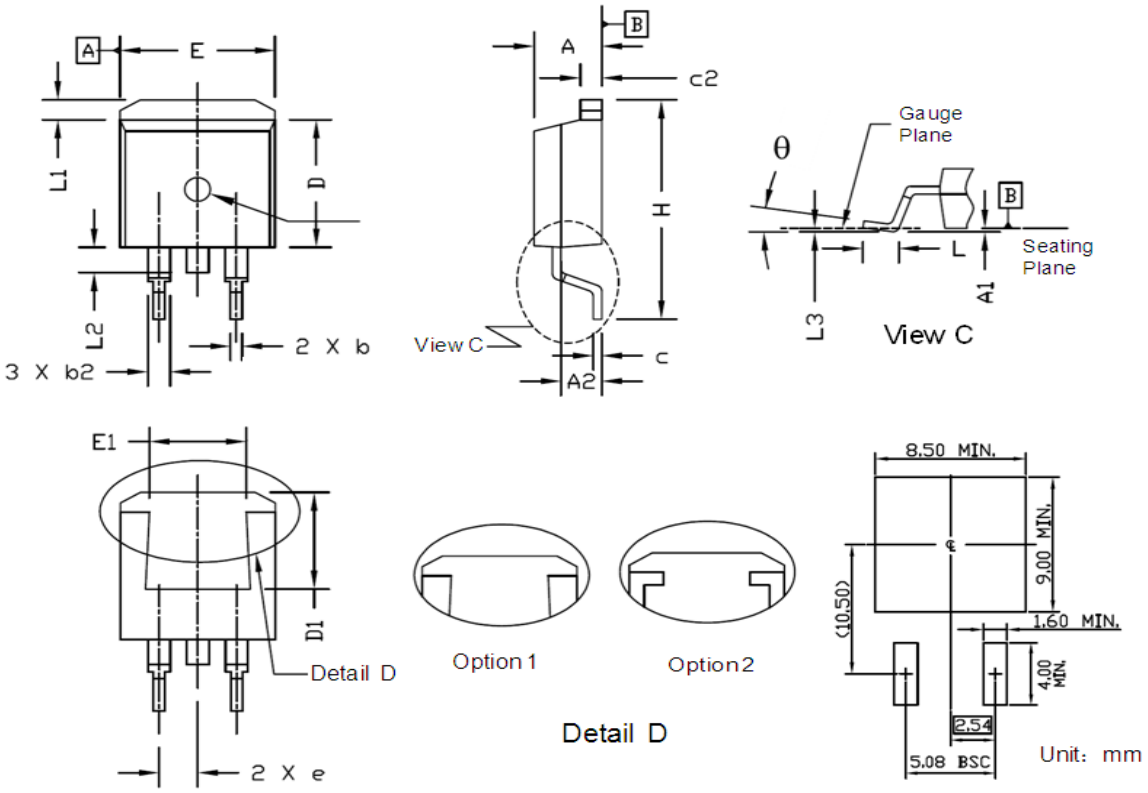


Diode Recovery Test Circuit & Waveforms





Package Outline: TO-263



Symbol		Dimensions In Millimeters		Dimensions In Inches	
		Min.	Max.	Min.	Max.
A		4.30	4.86	0.169	0.191
A1		0.00	0.25	0.000	0.010
A2		2.34	2.79	0.092	0.110
b		0.68	0.94	0.027	0.037
b2		1.14	1.78	0.045	0.070
c		0.33	0.65	0.013	0.026
c2		1.17	1.40	0.046	0.055
D		8.38	9.45	0.330	0.372
D1		6.90	8.17	0.272	0.322
e		2.54 BSC.		0.100 BSC.	
E		9.78	10.50	0.385	0.413
E1		6.50	8.60	0.256	0.339
H		14.61	15.88	0.575	0.625
L		1.78	2.79	0.070	0.110
L1		0.70	1.60	0.028	0.063
L2		1.00	1.78	0.039	0.070
L3		0.25 BSC.		0.010 BSC.	
θ	Option A	-8°	0°	-8°	0°
	Option B	0°	8°	0°	8°

Revision History

Revison	Date	Major changes
1.0	2019/8/13	Release of formal version
2.0	2023/5/26	Update format and Cxss

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.

CRM(CQ) reserves the right to improve product design, function and reliability without notice.