

Features

- CRM(CQ) Super_Junction technology
- Much lower $R_{on} \cdot A$ performance for On-state efficiency
- Much lower FOM for fast switching efficiency

Applications

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

Product Summary

V _{DS}	650V
R _{DS(on)_typ}	0.16Ω
I _D	20A

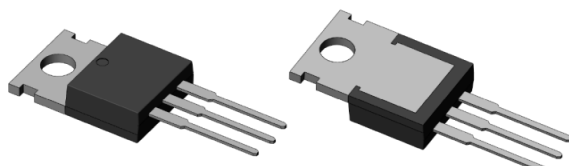
100% DVDS Tested

100% Avalanche Tested

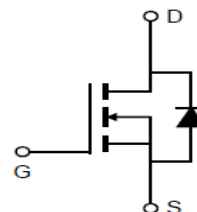


Top view

Bottom view



CRJT190N65GC



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
CRJT190N65GC	-	TO220	Tube	N/A	N/A	50pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V _{DS}	650	V
Continuous drain current	I _D	20	A
T _C = 25°C		14.0	A
T _C = 100°C			
Pulsed drain current (T _C = 25°C, t _p limited by T _{jmax})	I _{D pulse}	80	A
Avalanche energy, single pulse (L=60mH, R _g =30Ω)	E _{AS}	320	mJ
Gate-Source voltage	V _{GS}	±30	V
Power dissipation (T _C = 25°C)	P _{tot}	229	W
Operating junction and storage temperature	T _j , T _{stg}	-55...+150	°C

Thermal Resistance

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Thermal resistance, junction – case. Max	R _{thJC}	-	0.39	0.55	°C/W	
Thermal resistance, junction – ambient. Max	R _{thJA}	-	-	74	°C/W	

Electrical Characteristic (at T_j = 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}	-	-	1	μA	V _{DS} =650V, V _{GS} =0V
		-	20	-		T _C =25°C T _C =150°C
Gate-source leakage current	I _{GSS}	-		±100	nA	V _{GS} =±30V, V _{DS} =0V
Drain-source on-state resistance	R _{DS(on)}	-	0.16	0.19	Ω	V _{GS} =10V, I _D =10A,
		-	0.43	-		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}	-	1750	2625	pF	V _{GS} =0V, V _{DS} =100V, f=1MHz
Output Capacitance	C _{oss}	-	71	107		
Reverse Transfer Capacitance	C _{rss}	-	35	70		
Gate Total Charge	Q _G	-	49	74	nC	V _{GS} =10V, V _{DS} =480V, I _D =10A, f=1MHz
Gate-Source charge	Q _{gs}	-	11.5	23		
Gate-Drain charge	Q _{gd}	-	20	40		
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	1.9	Ω	V _{GS} =0V, V _{DS} =0V, 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	606	ns	$I_{SD}=10A$ $dI/dt=100A/\mu s, V_{DS}=100V$
Body Diode Reverse Recovery Charge	Q_{rr}	-	3.76	7.52	uC	

Typical Performance Characteristics

Fig 1. Output Characteristics ($T_J=25^\circ\text{C}$)

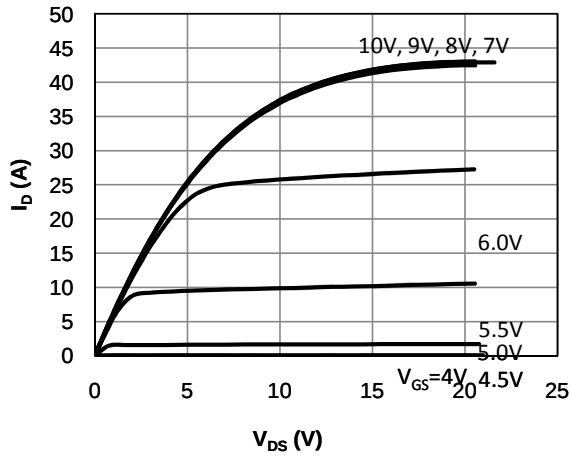


Fig 2. Output Characteristics ($T_J=150^\circ\text{C}$)

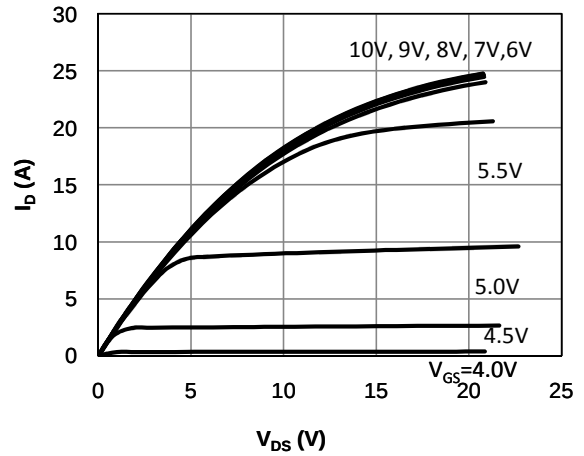


Fig 3: Transfer Characteristics

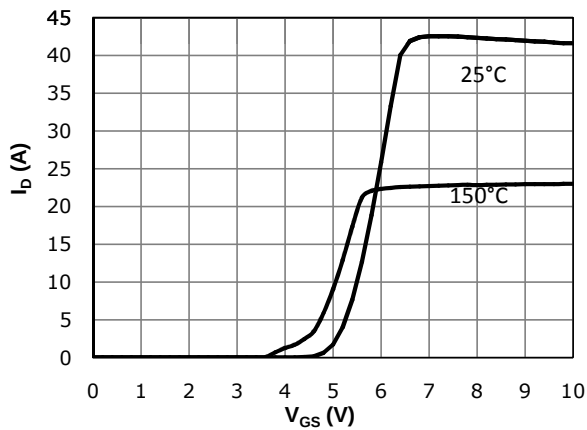


Fig 4: V_{TH} Vs T_J Temperature Characteristics

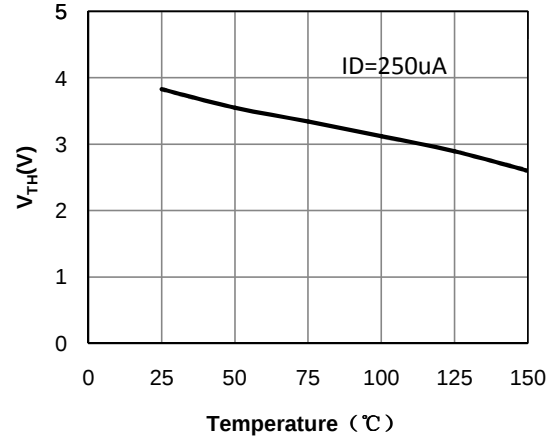


Fig 5: $R_{DS(on)}$ Vs I_{DS} Characteristics ($T_C=25^\circ\text{C}$)

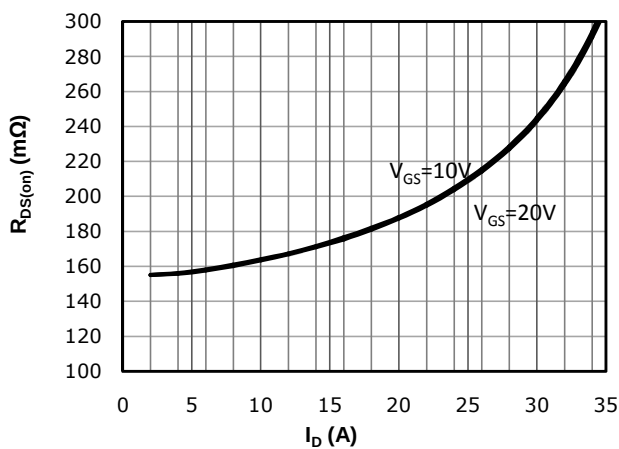


Fig 6: $R_{DS(on)}$ vs. Temperature

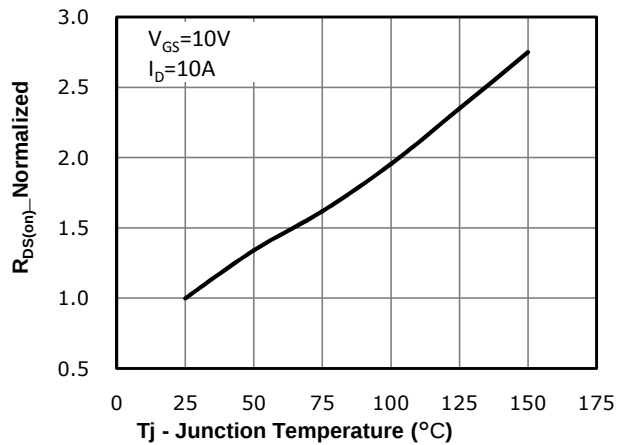


Fig 7: BVDSS vs. Temperature

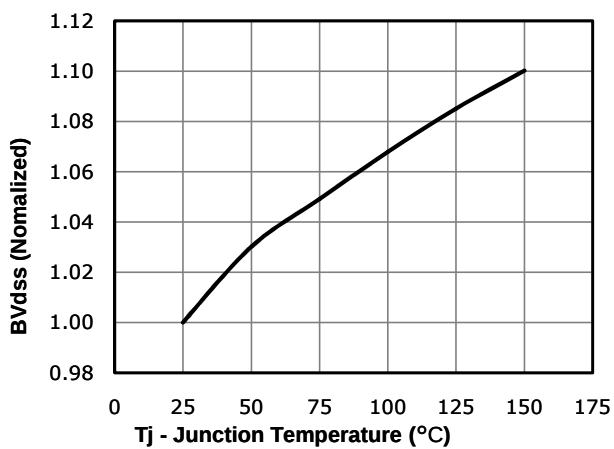


Fig 8: Rds(on) vs Gate Voltage

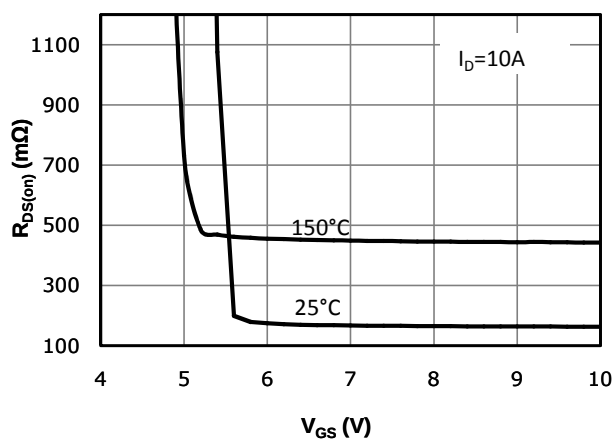


Fig 9: Body-diode Forward Characteristics

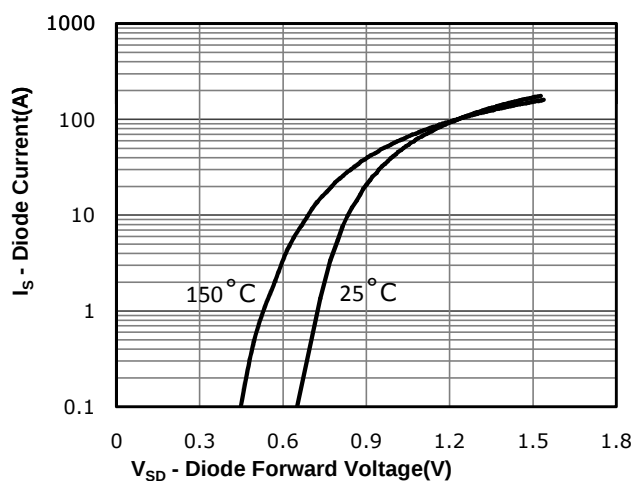


Fig 10: Gate Charge Characteristics

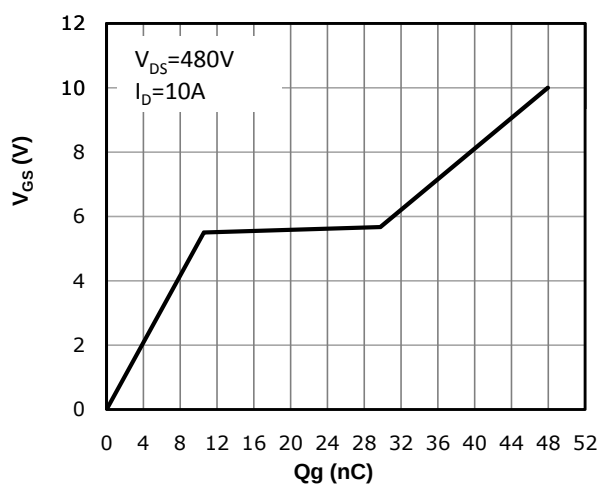


Fig 11: Capacitance Characteristics

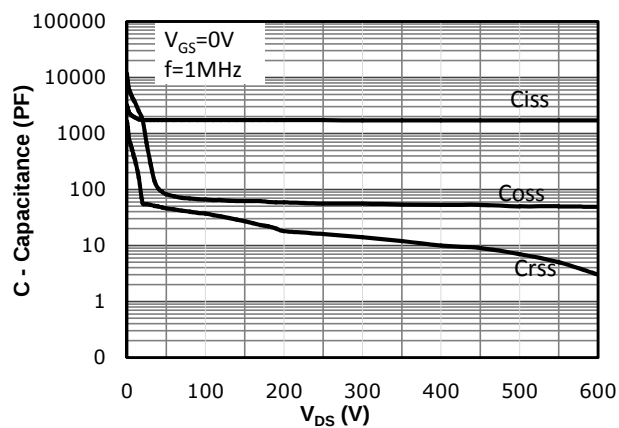
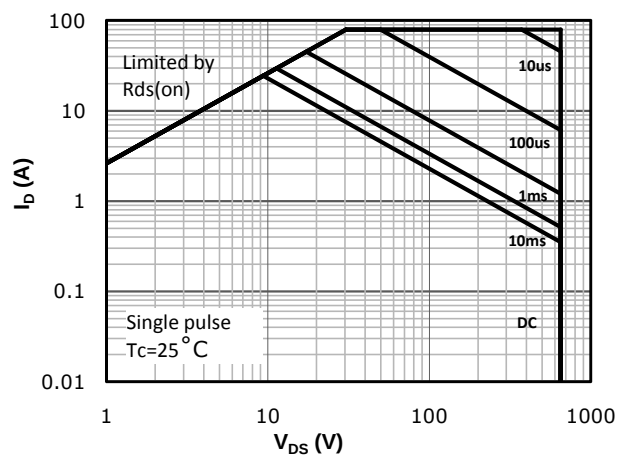
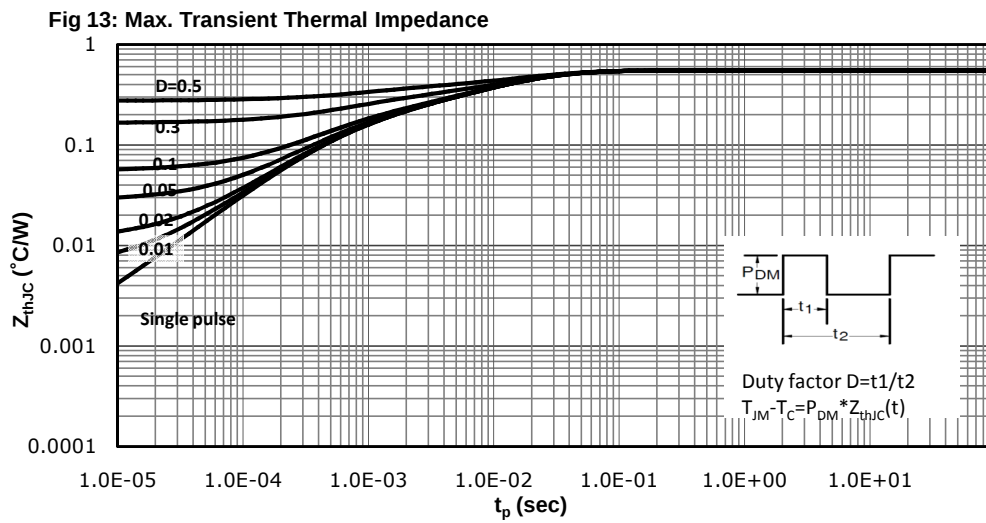


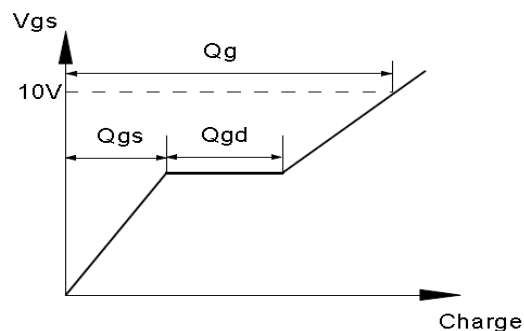
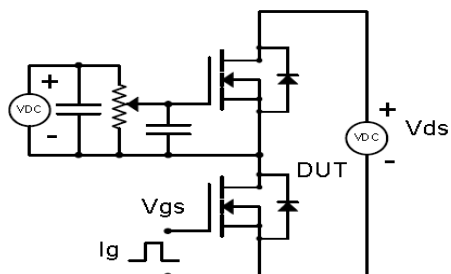
Fig 12: Safe Operating Area



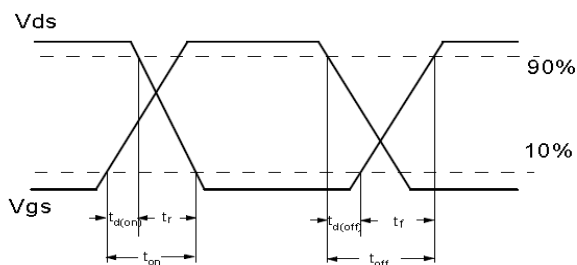
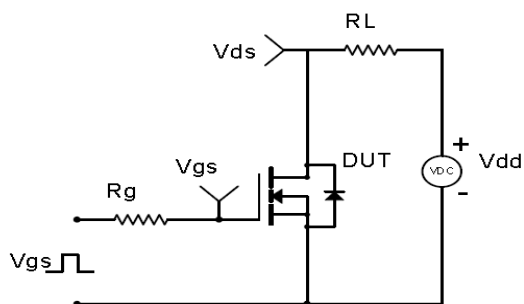


Test Circuit & Waveform

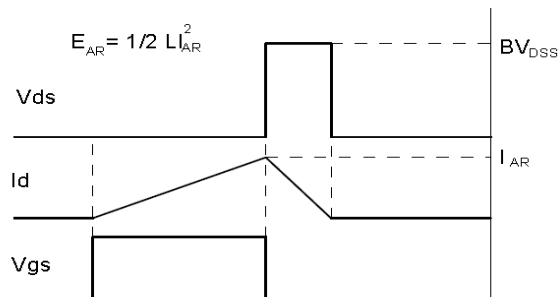
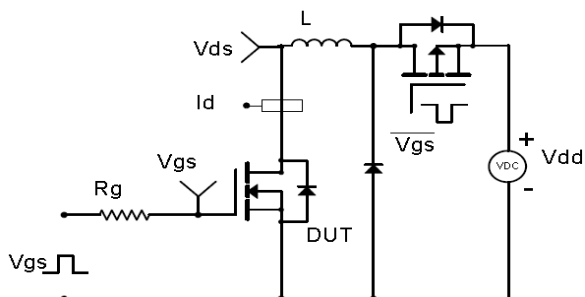
Gate Charge Test Circuit & Waveform



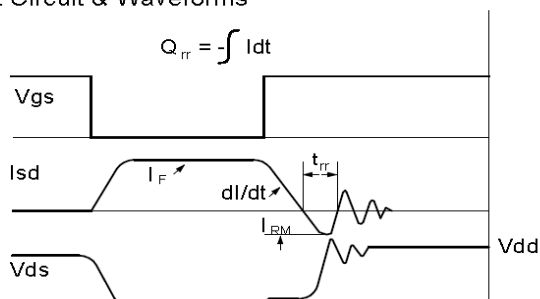
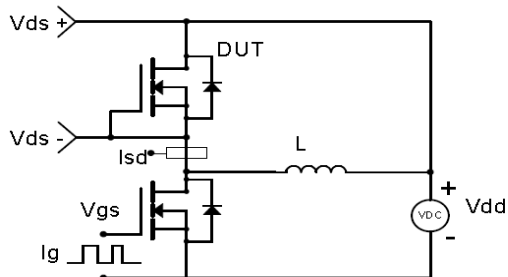
Resistive Switching Test Circuit & Waveforms



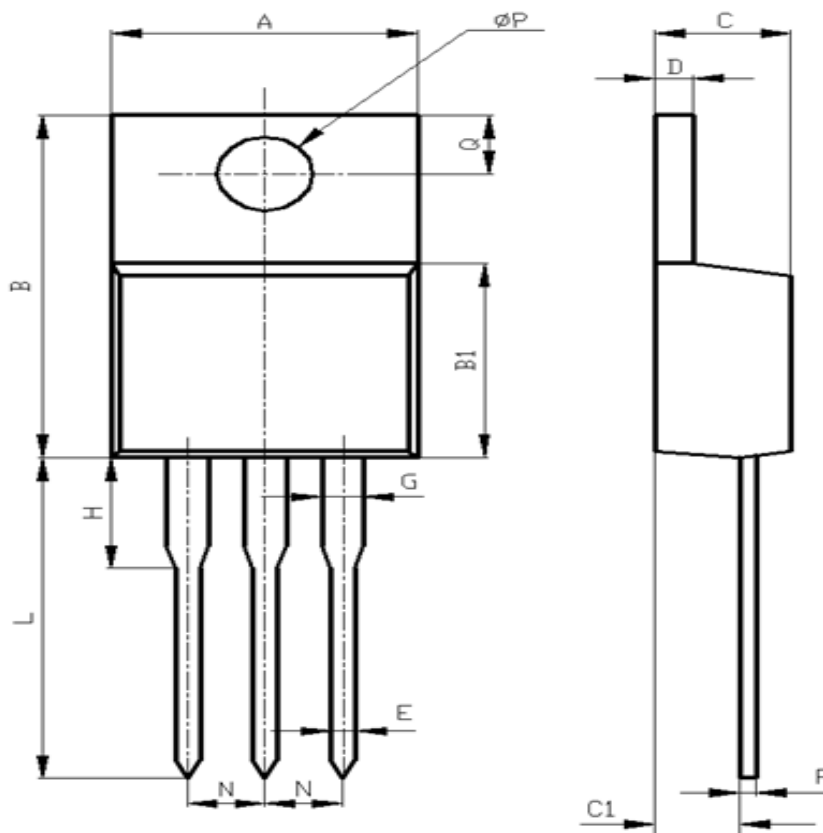
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: TO-220



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	9.60	10.60	0.378	0.417
B	15.00	16.00	0.591	0.630
B1	8.90	9.50	0.350	0.374
C	4.30	4.80	0.169	0.189
C1	2.30	3.10	0.091	0.122
D	1.20	1.40	0.047	0.055
E	0.70	0.90	0.028	0.035
F	0.30	0.60	0.012	0.024
G	1.17	1.37	0.046	0.054
H	2.70	3.80	0.106	0.150
L	12.60	14.80	0.496	0.583
N	2.34	2.74	0.092	0.108
Q	2.40	3.00	0.094	0.118
ØP	3.50	3.90	0.138	0.154

Marking



NOTE:
NXBBAAAAY
X —Assembly location code
BB —Fab code
AAAA —Lot code
Y —Bin code

Revision History

Revision	Date	Major changes
1.0	2020-7-9	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.

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