华润微电子(重庆)有限公司

# CRJS10KN120G2Q

SJMOS N-MOSFET 1200V, 6.1Ω, 2A

## Features

- CRM(CQ) Super_Junction technology
- Much lower Ron*A performance for On-state efficiency
- Better efficiency due to very low FOM
- Easy to use/drive
- AEC-Q101 qualified

## Product Summary

| | |
|---|---|
| $V_{DS,min}$ | 1200V |
| $R_{DS(on),typ}$ | 6.1Ω |
| $I_D$ | 2A |

## Applications

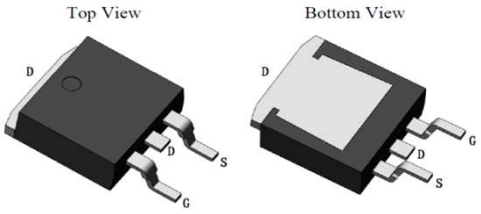
Suitable for PFC and DC-DC stages for:

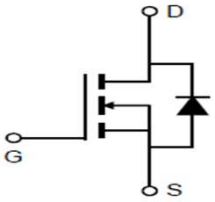
- Unidirectional and bidirectional DC-DC converters,
- On-Board battery Chargers

***100% DVDS Tested***

***100% Avalanche Tested***

RoHS HF




## Package Marking and Ordering Information

| Part # | Marking | Package | Packing | Reel Size | Tape Width | Qty |
|---|---|---|---|---|---|---|
| CRJS10KN120G2Q | CRJS10KN120G2Q | TO-263 | Tape&Reel | N/A | N/A | 1000pcs |

## Absolute Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-source voltage | $V_{DS}$ | 1200 | V |
| Continuous drain current [1)]<br>$T_C$ = 25°C<br>$T_C$ = 100°C | $I_D$ | <br>1.6<br>1 | A |
| Pulsed drain current [2)]($T_C$ = 25°C, $t_p$ limited by $T_{j,max}$) | $I_{D,pulse}$ | 6 | A |
| Avalanche energy, single pulse (L=30mH) | $E_{AS}$ | 7 | mJ |
| MOSFET dv/dt ruggedness | dv/dt | 50 | V/ns |
| Gate-Source voltage | $V_{GS}$ | ±30 | V |
| Power dissipation ($T_C$ = 25°C) | $P_{tot}$ | 65 | W |
| Continuous diode forward current($T_C$ = 25°C) | $I_S$ | 2 | A |
| Diode pulse current [2)] ($T_C$ = 25°C) | $I_{S,pulse}$ | 6 | 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 $T_{j,max}$. Maximum Duty Cycle D = 0.50

2) Pulse width $t_p$ limited by $T_{j,max}$

3) Identical low side and high side switch with identical $R_g$


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## Thermal Resistance

| Parameter | Symbol | Value | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | min. | typ. | max. | | |
| Thermal resistance, junction – case | $R_{thJC}$ | - | 1.37 | 1.91 | °C/W | |
| Thermal resistance, junction – ambient | $R_{thJA}$ | - | - | 94 | °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 | $BV_{DSS}$ | 1200 | - | - | V | $V_{GS}$=0V,$I_D$=250μA |
| Gate threshold voltage | $V_{GS(th)}$ | 2 | - | 4 | V | $V_{DS}$=$V_{GS}$,$I_D$=250μA |
| Zero gate voltage drain current | $I_{DSS}$ | - | - | 0.5 | μA | $V_{DS}$=1200V,$V_{GS}$=0V<br>$T_j$=25°C |
| | | - | 5 | - | | $T_j$=150°C |
| Gate-source leakage current | $I_{GSS}$ | - | - | ±100 | nA | $V_{GS}$=±30V,$V_{DS}$=0V |
| Drain-source on-state resistance | $R_{DS(on)}$ | - | 6.1 | 10 | Ω | $V_{GS}$=10V,$I_D$=0.75A,<br>$T_j$=25°C |
| | | - | 15.2 | - | | $T_j$=150°C |
| Transconductance | $g_{fs}$ | - | 1.4 | - | S | $V_{DS}$=20V,$I_D$=0.75A |
| **Dynamic Characteristic** | | | | | | |
| Input Capacitance | $C_{iss}$ | - | 204 | - | pF | $V_{GS}$=0V, $V_{DS}$=100V, f=100kHz |
| Output Capacitance | $C_{oss}$ | - | 15 | - | | |
| Reverse Transfer Capacitance | $C_{rss}$ | - | 0.81 | - | | |
| Gate Total Charge | $Q_g$ | - | 8.1 | - | nC | $V_{GS}$=10V, $V_{DS}$=960V, $I_D$=1.5A |
| Gate-Source charge | $Q_{gs}$ | - | 1.7 | - | | |
| Gate-Drain charge | $Q_{gd}$ | - | 3.8 | - | | |
| Gate plateau voltage | $V_{plateau}$ | - | 5.3 | - | V | |
| Turn-on delay time | $t_{d(on)}$ | - | 9 | - | ns | $V_{GS}$=10V, $I_D$=0.75A, $V_{DS}$=600V, $R_g$=4.7Ω |
| Rise time | $t_r$ | - | 22 | - | | |
| Turn-off delay time | $t_{d(off)}$ | - | 44 | - | | |
| Fall time | $t_f$ | - | 68 | - | | |
| Gate resistance | $R_{g,int}$ | - | 9.7 | - | Ω | f=1MHz |


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## Body Diode Characteristic

| Parameter | Symbol | Value | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | min. | typ. | max. | | |
| Body Diode Forward Voltage | $V_{SD}$ | 0.6 | 0.85 | 1.1 | V | $V_{GS}$=0V,$I_{SD}$=0.75A |
| Body Diode Reverse Recovery Time | $t_{rr}$ | - | 255 | - | ns | $I_{SD}$=1.5A<br>$di_F/dt$=100A/μs<br>$V_{DS}$=400V |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | - | 1.3 | - | μC | |
| Body Diode Reverse Recovery Peak Current | $I_{rrm}$ | - | 10.3 | - | A | |


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## Typical Performance Characteristics

Fig 1. Output Characteristics ($T_j$=25℃)

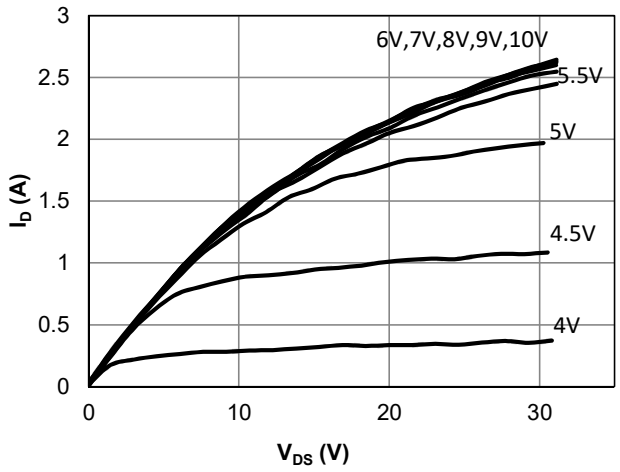



Fig 2. Output Characteristics ($T_j$=150℃)

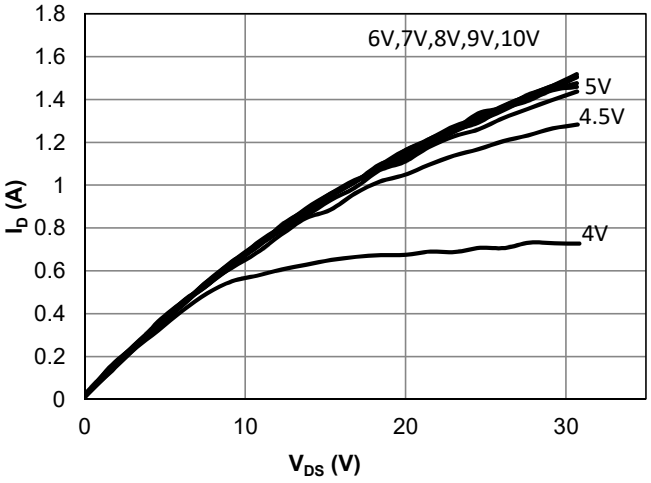



Fig 3: Transfer Characteristics

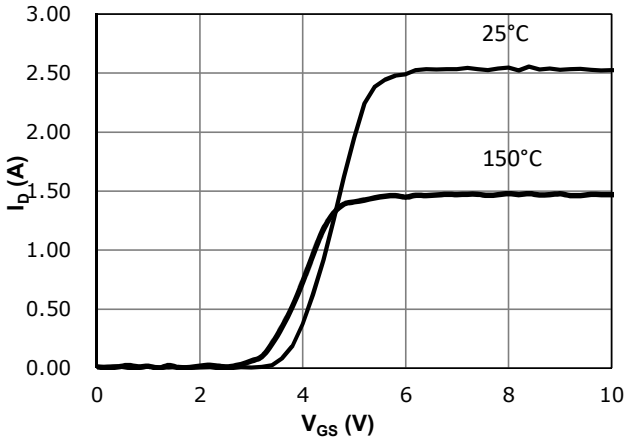



Fig 4: $V_{TH}$ vs. $T_j$ Temperature Characteristics

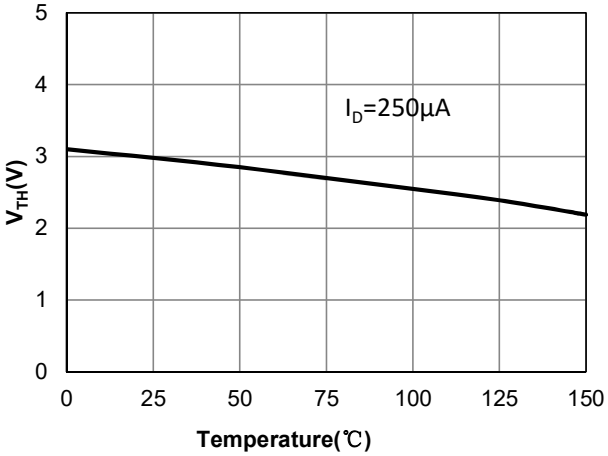



Fig 5: $R_{DS(on)}$ vs. $I_{DS}$ Characteristics($T_j$=25℃)

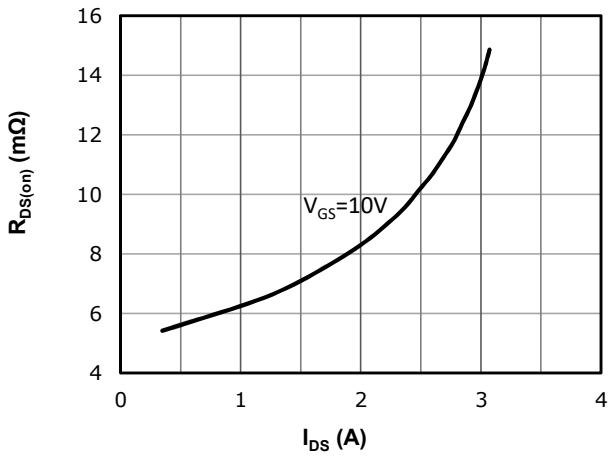
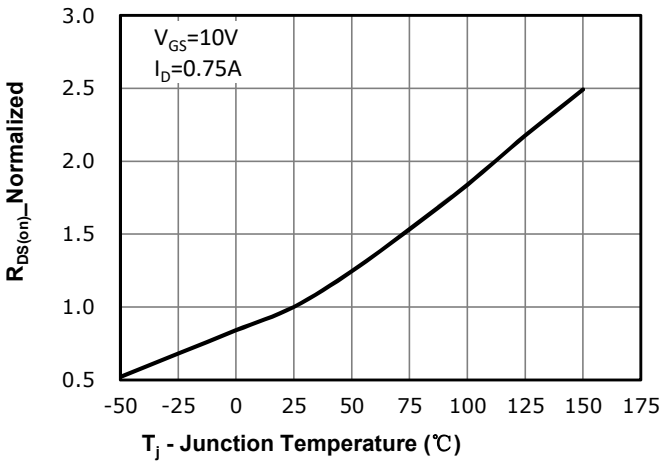



Fig 6: $R_{DS(on)}$ vs. Temperature





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**Fig 7: $BV_{DSS}$ vs. Temperature**

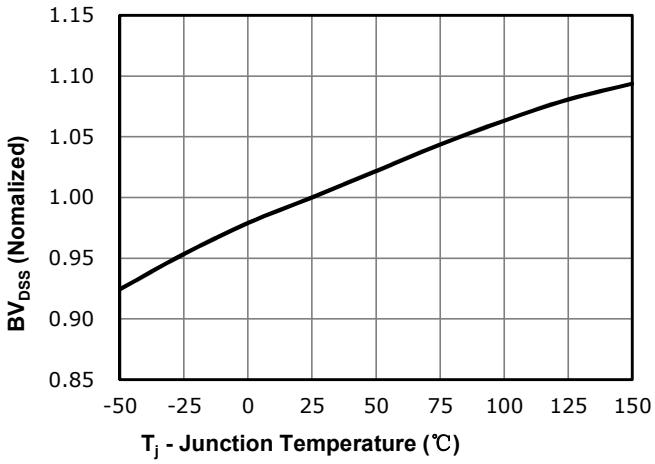



**Fig 8: $R_{DS(on)}$ vs. Gate Voltage**

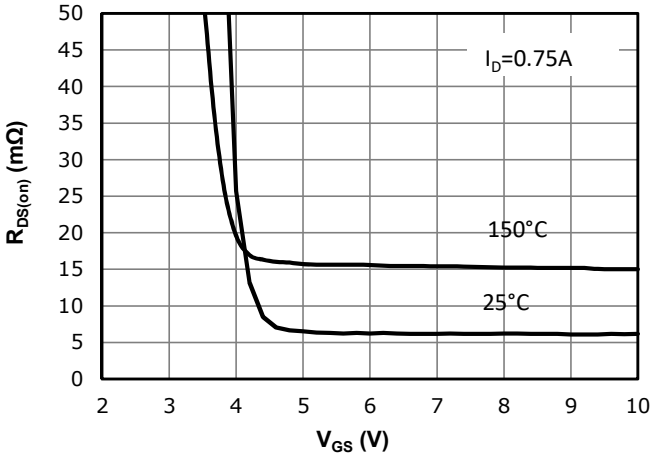



**Fig 9: Body-diode Forward Characteristics**

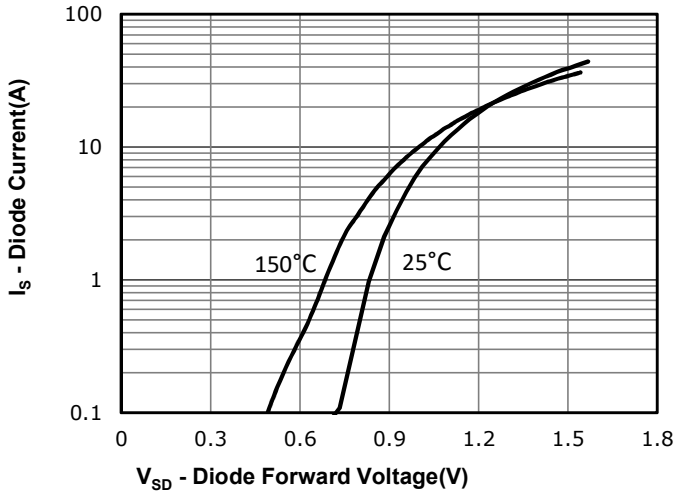



**Fig 10: Gate Charge Characteristics**

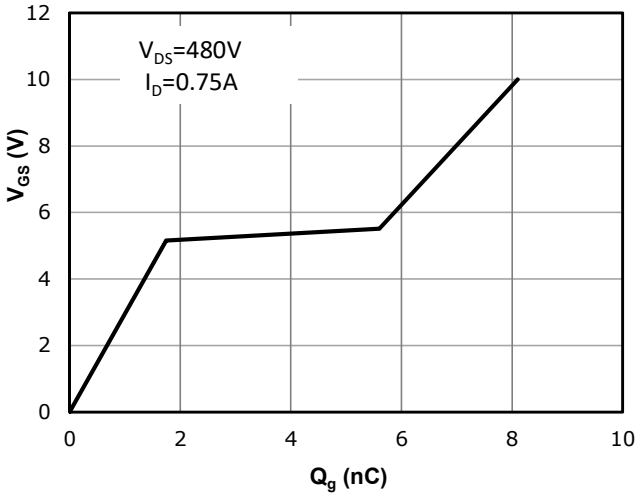



**Fig 11: Capacitance Characteristics**

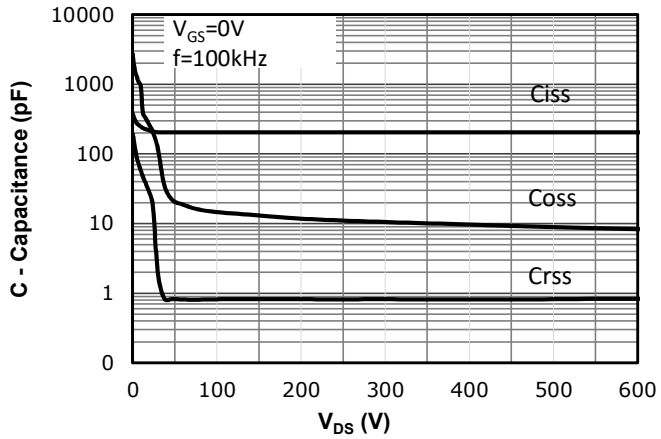
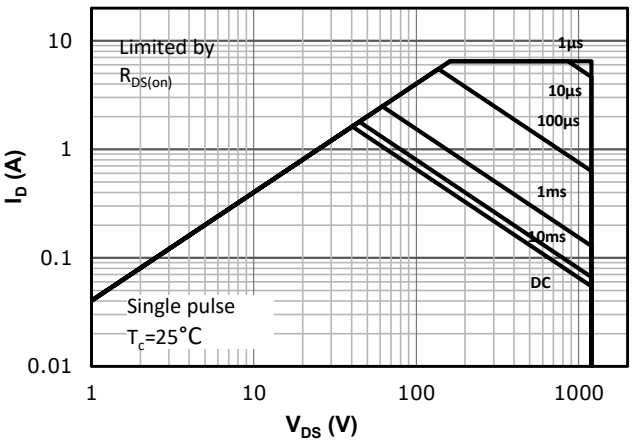


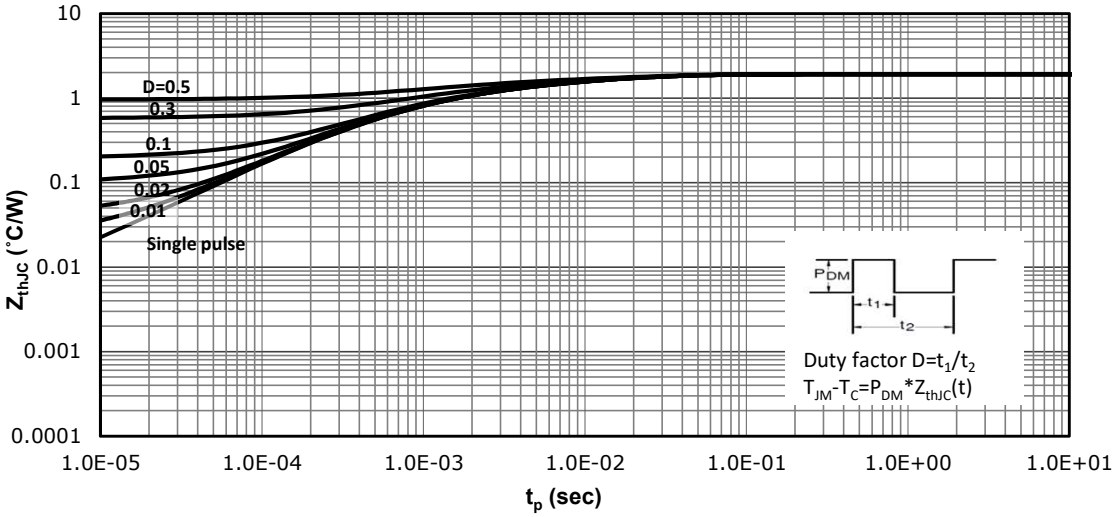

**Fig 12: Safe Operating Area**





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**Fig 13: Max. Transient Thermal Impedance**

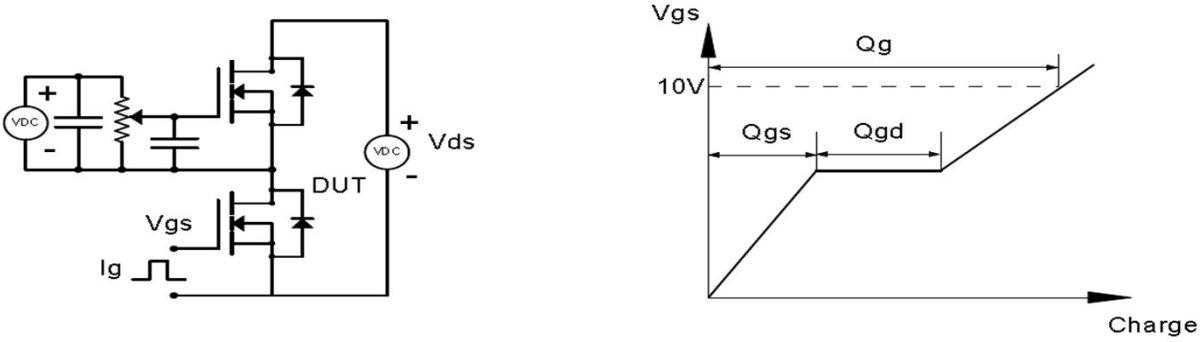




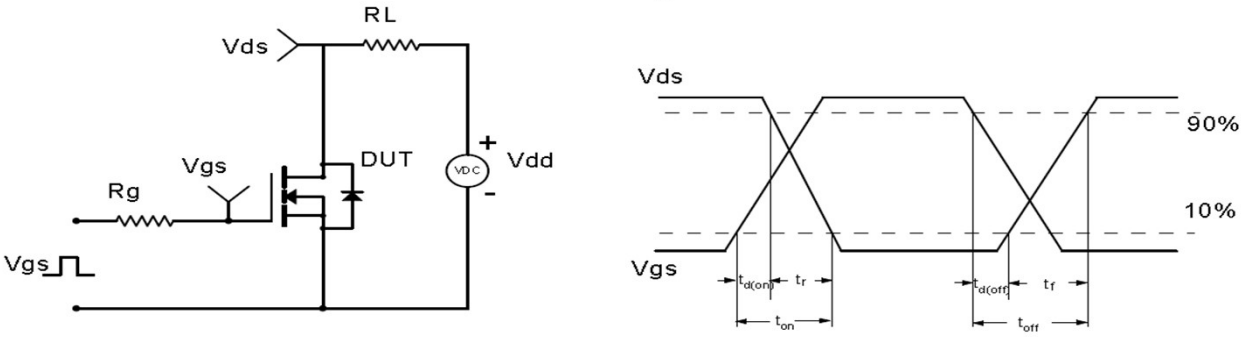
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## Test Circuit & Waveform

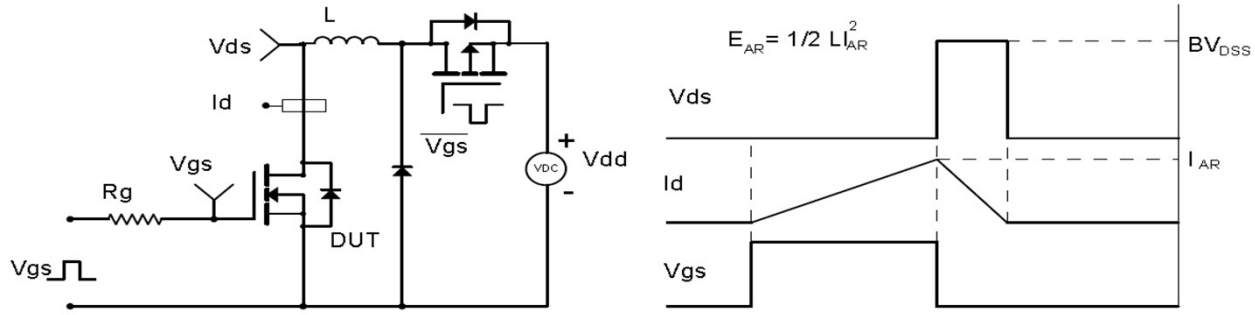
Gate Charge Test Circuit & Waveform



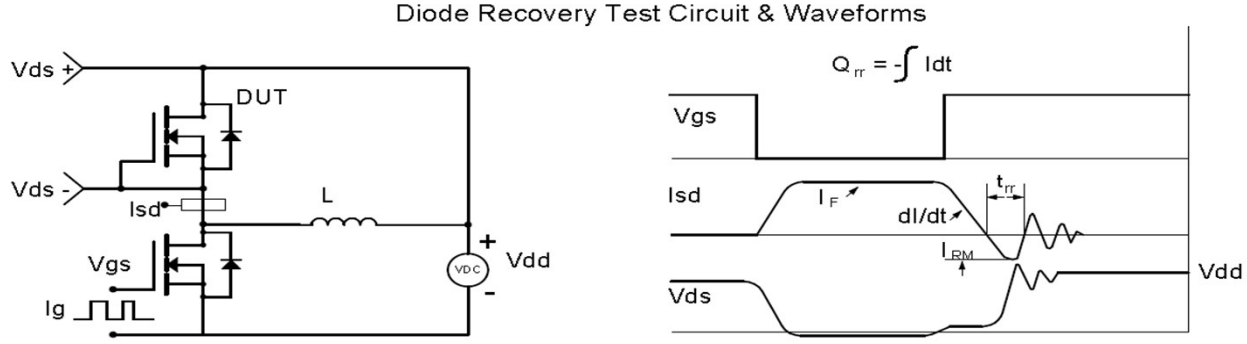

Resistive Switching Test Circuit & Waveforms




Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



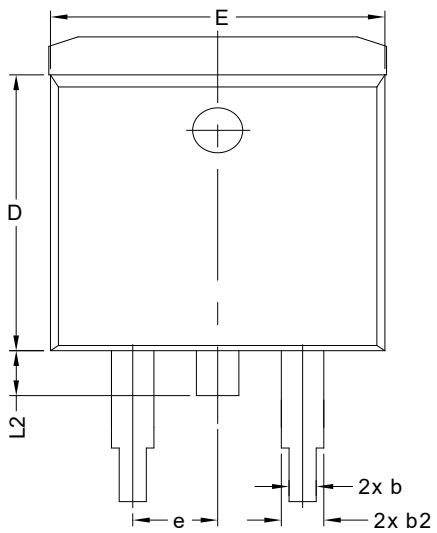

Diode Recovery Test Circuit & Waveforms



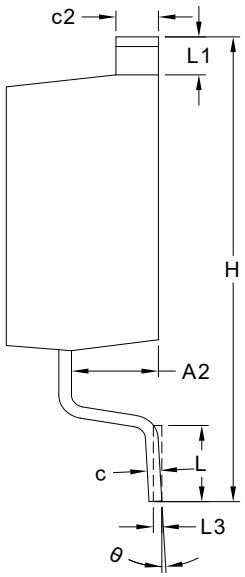


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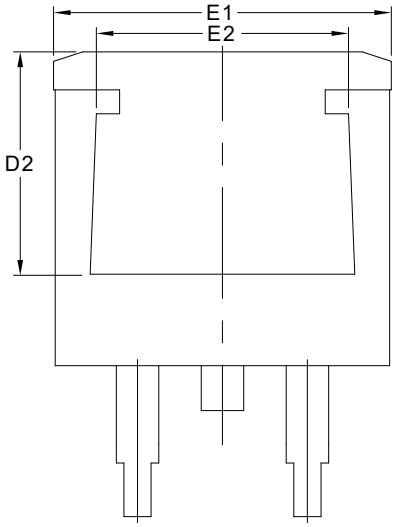
## Package Outline: TO-263



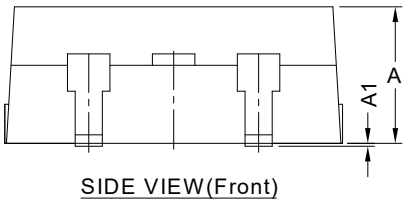

TOP VIEW




SIDE VIEW(Right)




BOTTOM VIEW




SIDE VIEW(Front)

| Symbol | Dimensions In Millimeters | | | Dimensions In Inches | | |
|---|---|---|---|---|---|---|
| | Min. | NOM. | Max. | Min. | NOM. | Max. |
| A | 4.40 | 4.55 | 4.70 | 0.173 | 0.179 | 0.185 |
| A1 | 0.00 | - | 0.25 | 0.000 | - | 0.010 |
| A2 | 2.20 | 2.60 | 2.90 | 0.087 | 0.102 | 0.114 |
| b | 0.68 | 0.85 | 0.96 | 0.027 | 0.033 | 0.038 |
| b2 | 1.14 | 1.31 | 1.78 | 0.045 | 0.052 | 0.070 |
| c | 0.33 | 0.40 | 0.65 | 0.013 | 0.016 | 0.026 |
| c2 | 1.17 | 1.31 | 1.41 | 0.046 | 0.052 | 0.056 |
| D | 9.00 | 9.20 | 9.40 | 0.354 | 0.362 | 0.370 |
| D2 | 7.10 | 7.41 | 7.70 | 0.280 | 0.292 | 0.303 |
| E | 9.80 | 10.00 | 10.20 | 0.386 | 0.394 | 0.402 |
| E1 | 9.80 | 10.10 | 10.40 | 0.386 | 0.398 | 0.409 |
| E2 | 7.00 | 7.54 | 8.60 | 0.276 | 0.297 | 0.339 |
| e | | 2.54 BSC | | | 0.100 BSC | |
| H | 15.20 | 15.50 | 15.80 | 0.598 | 0.610 | 0.622 |
| L | 1.78 | 2.54 | 2.79 | 0.070 | 0.100 | 0.110 |
| L1 | 0.97 | 1.27 | 1.57 | 0.038 | 0.050 | 0.062 |
| L2 | 1.20 | 1.50 | 1.78 | 0.047 | 0.059 | 0.070 |
| L3 | | 0.254 BSC | | | 0.010 BSC | |
| θ | 0° | - | 8° | 0° | - | 8° |


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## Marking




NOTE:
NXBBAAAA

| | |
|---|---|
| N | —WB code (Usually omitted) |
| X | —Assembly location code |
| BB | —Fab code |
| AAAA | —Lot code |


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## Revision History

| Revison | Major changes |
|---|---|
| 1.0 | First version |
| 2.0 | Formal version |

## Disclaimer

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