华润微电子(重庆)有限公司

# CRJT69N60G2

SJMOS N-MOSFET 600V, 63mΩ, 40A

## Features

- CRM(CQ) Super_Junction technology
- Much lower Ron*A performance for On-state efficiency
- Better efficiency due to very low FOM
- Qualified for industrial grade applications according to JEDEC

## Product Summary

| | |
|---|---|
| $V_{DS,min}$ | 600V |
| $R_{DS(on),typ}$ | 63mΩ |
| $I_D$ | 40A |

## Applications

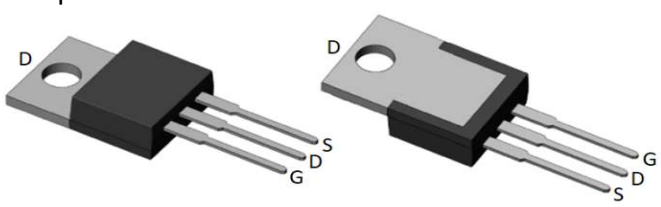
- LED/LCD/PDP TV and monitor Lighting
- Solar/Renewable/UPS-Micro Inverter System
- Charger
- Power Supply

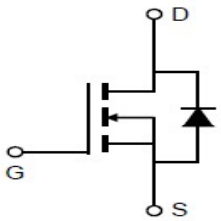
***100% DVDS Tested***

***100% Avalanche Tested***

RoHS HF

Top view Bottom view




## Package Marking and Ordering Information

| Part # | Marking | Package | Packing | Reel Size | Tape Width | Qty |
|---|---|---|---|---|---|---|
| CRJT69N60G2 | CRJT69N60G2 | TO-220 | Tube | N/A | N/A | 50pcs |

## Absolute Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-source voltage | $V_{DS}$ | 600 | V |
| Continuous drain current [1)]<br>$T_C$ = 25°C<br>$T_C$ = 100°C | $I_D$ | <br>40<br>25 | A |
| Pulsed drain current [2)]($T_C$ = 25°C, $t_p$ limited by $T_{j,max}$) | $I_{D,pulse}$ | 161 | A |
| Avalanche energy, single pulse (L=30mH) | $E_{AS}$ | 520 | mJ |
| MOSFET dv/dt ruggedness | dv/dt | 50 | V/ns |
| Gate-Source voltage | $V_{GS}$ | ±30 | V |
| Power dissipation ($T_C$ = 25°C) | $P_{tot}$ | 288 | W |
| Continuous diode forward current($T_C$ = 25°C) | $I_S$ | 40 | A |
| Diode pulse current [2)] ($T_C$ = 25°C) | $I_{S,pulse}$ | 161 | 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 | $R_{thJC}$ | - | 0.31 | 0.43 | °C/W | |
| Thermal resistance, junction – ambient | $R_{thJA}$ | - | - | 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 | $BV_{DSS}$ | 600 | - | - | V | $V_{GS}$=0V,$I_D$=250μA |
| Gate threshold voltage | $V_{GS(th)}$ | 3 | - | 4 | V | $V_{DS}$=$V_{GS}$,$I_D$=250μA |
| Zero gate voltage drain current | $I_{DSS}$ | - | - | 1 | μA | $V_{DS}$=600V,$V_{GS}$=0V<br>$T_j$=25°C |
| | | - | 15 | - | | $T_j$=150°C |
| Gate-source leakage current | $I_{GSS}$ | - | - | ±100 | nA | $V_{GS}$=±30V,$V_{DS}$=0V |
| Drain-source on-state resistance | $R_{DS(on)}$ | - | 63 | 73 | mΩ | $V_{GS}$=10V,$I_D$=23A,<br>$T_j$=25°C |
| | | - | 177 | - | | $T_j$=150°C |
| Transconductance | $g_{fs}$ | - | 35 | - | S | $V_{DS}$=20V,$I_D$=23A |
| **Dynamic Characteristic** | | | | | | |
| Input Capacitance | $C_{iss}$ | - | 2520 | - | pF | $V_{GS}$=0V, $V_{DS}$=100V, f=1MHz |
| Output Capacitance | $C_{oss}$ | - | 125 | - | | |
| Reverse Transfer Capacitance | $C_{rss}$ | - | 2.6 | - | | |
| Gate Total Charge | $Q_g$ | - | 79 | - | nC | $V_{GS}$=10V, $V_{DS}$=480V, $I_D$=23A |
| Gate-Source charge | $Q_{gs}$ | - | 18 | - | | |
| Gate-Drain charge | $Q_{gd}$ | - | 34 | - | | |
| Gate plateau voltage | $V_{plateau}$ | - | 6.1 | - | V | |
| Turn-on delay time | $t_{d(on)}$ | - | 46 | - | ns | $V_{GS}$=10V, $I_D$=23A, $V_{DS}$=400V, $R_g$=27Ω |
| Rise time | $t_r$ | - | 48 | - | | |
| Turn-off delay time | $t_{d(off)}$ | - | 253 | - | | |
| Fall time | $t_f$ | - | 45 | - | | |
| Gate resistance | $R_{g,int}$ | - | 0.9 | - | 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 | 0.87 | 1.1 | V | $V_{GS}$=0V,$I_{SD}$=23A |
| Body Diode Reverse Recovery Time | $t_{rr}$ | - | 396 | - | ns | $I_{SD}$=23A<br>$di_F/dt$=100A/μs<br>$V_{DS}$=400V |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | - | 8 | - | μC | |


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## Typical Performance Characteristics

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

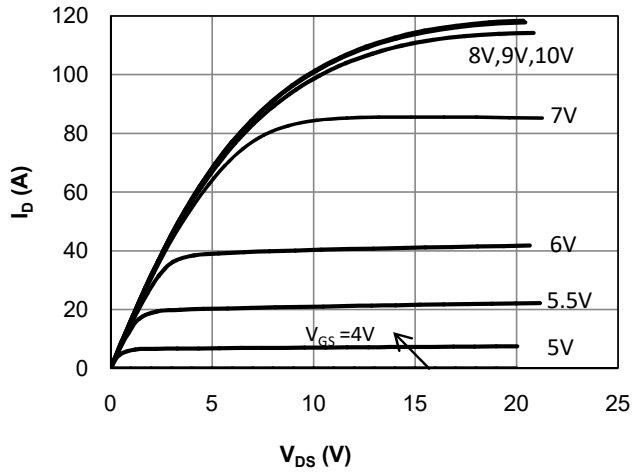



Fig 2. Output Characteristics ($T_j$=150℃)

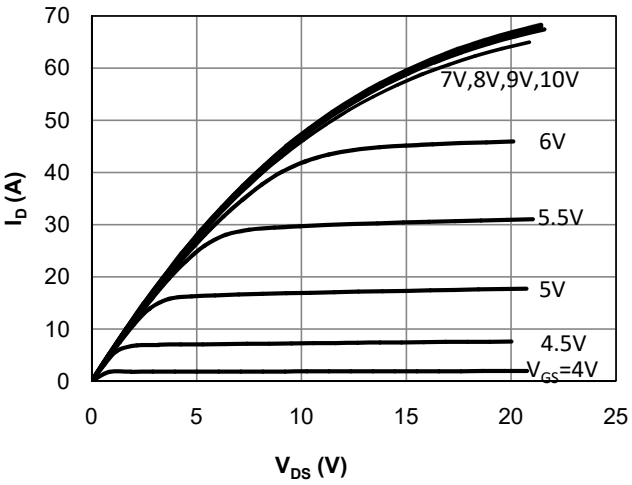



Fig 3: Transfer Characteristics

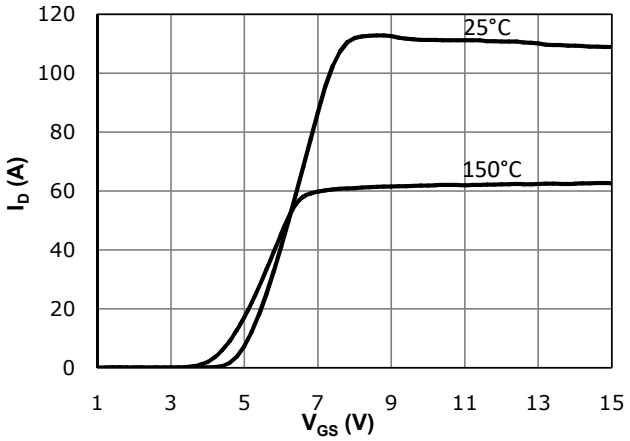



Fig 4: $V_{TH}$ vs. $T_j$ Temperature Characteristics

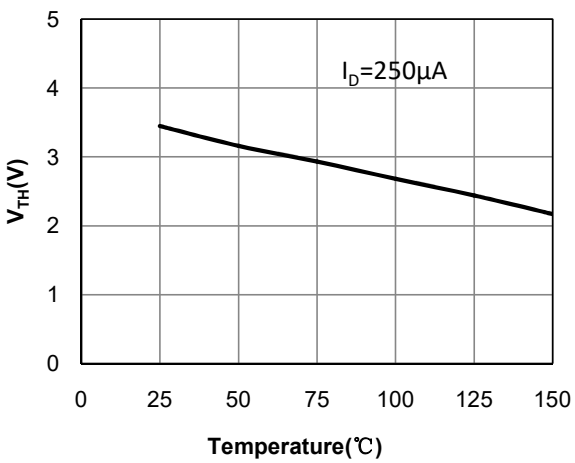



Fig 5: $R_{DS(on)}$ vs. $I_{DS}$ Characteristics($T_j$=25℃)

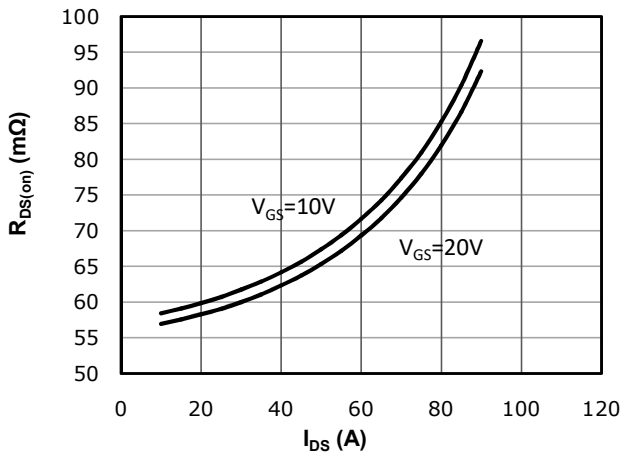
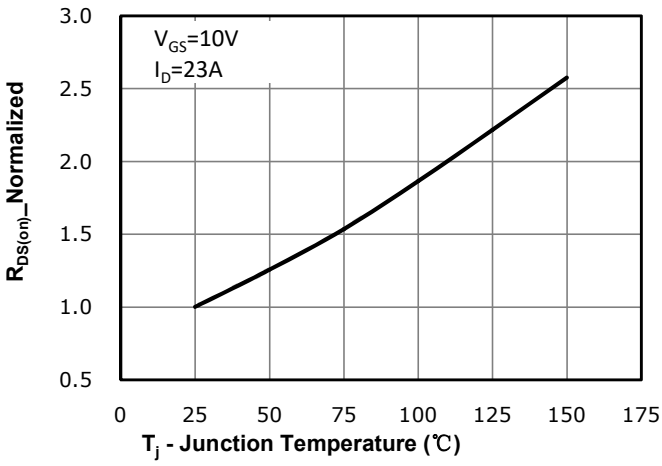



Fig 6: $R_{DS(on)}$ vs. Temperature





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

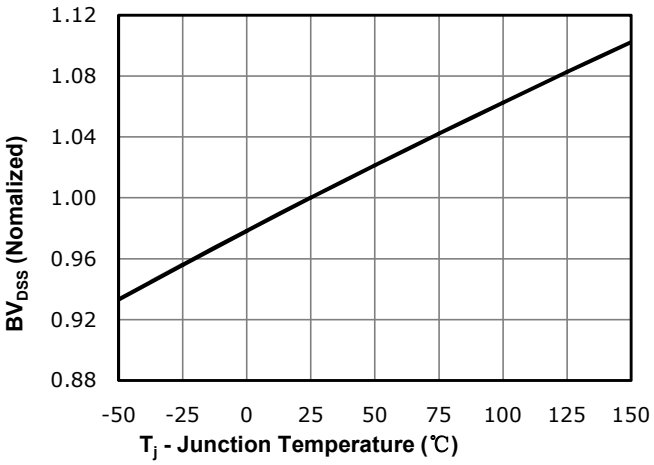



**Fig 8: $R_{DS(on)}$ vs. Gate Voltage**

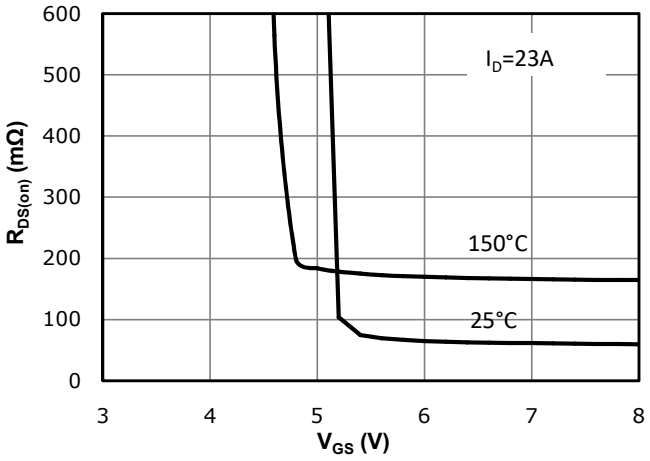



**Fig 9: Body-diode Forward Characteristics**

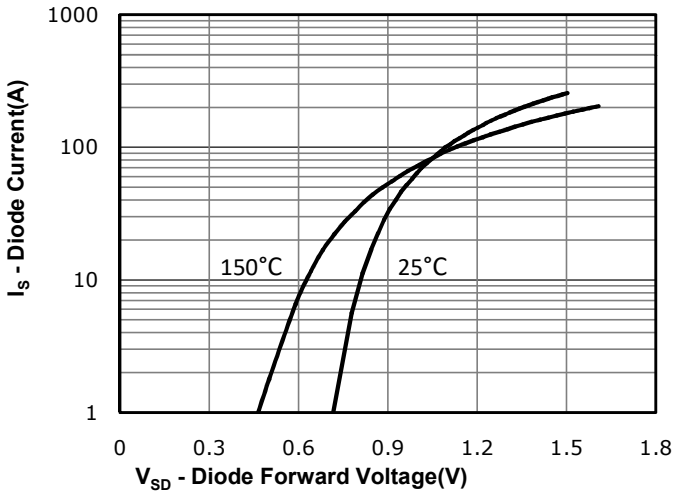



**Fig 10: Gate Charge Characteristics**

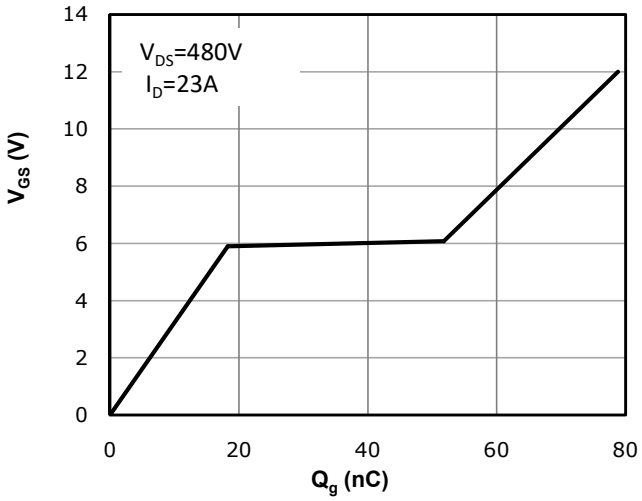



**Fig 11: Capacitance Characteristics**

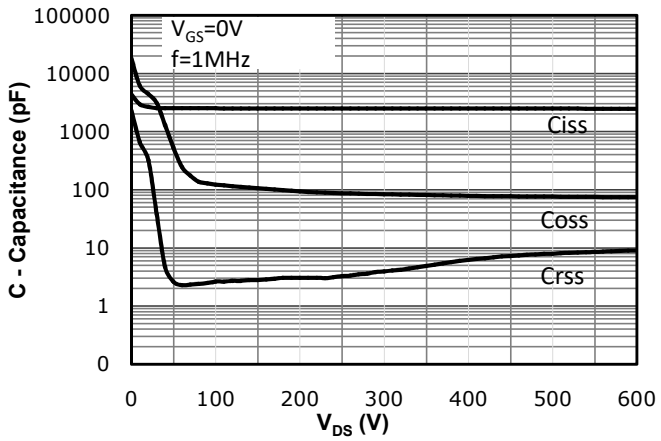
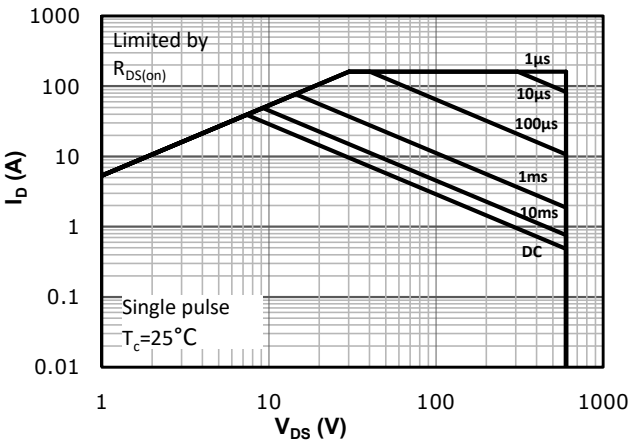


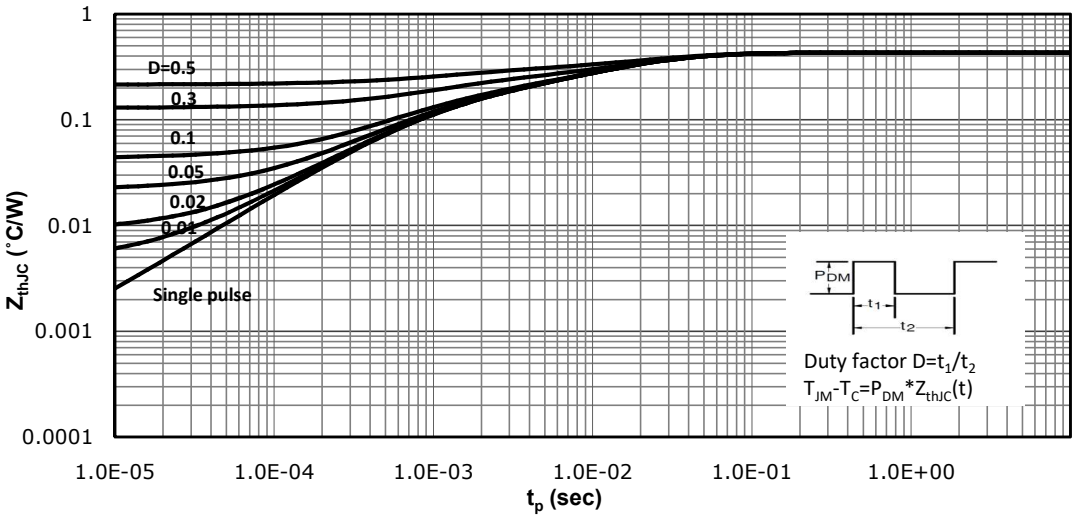

**Fig 12: Safe Operating Area**





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

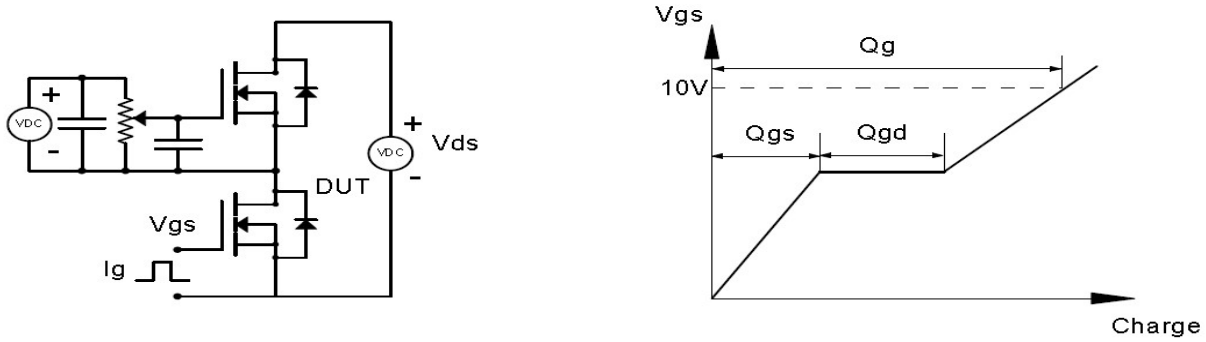




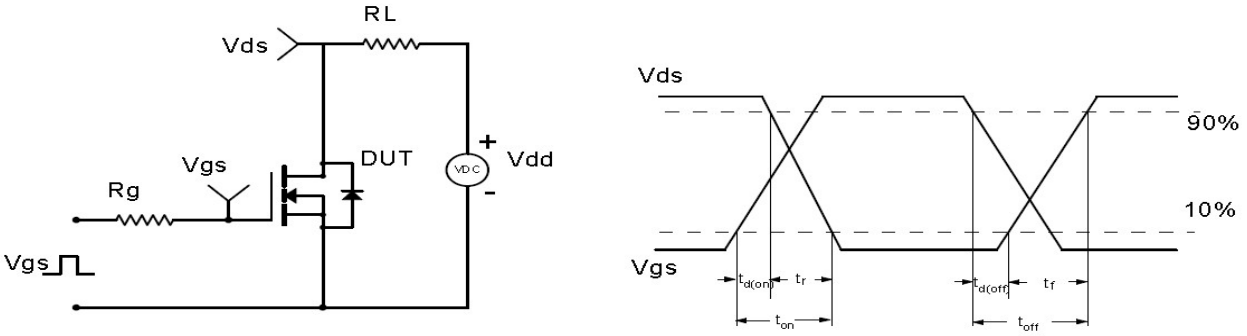
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## Test Circuit & Waveform

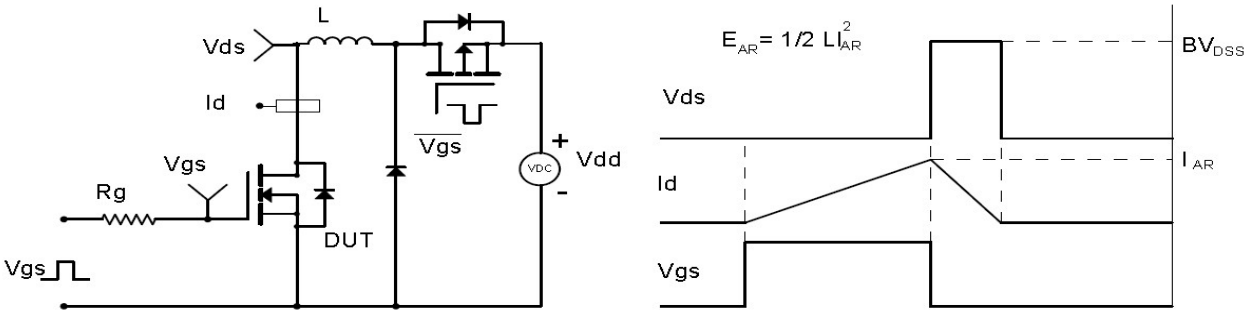
Gate Charge Test Circuit & Waveform



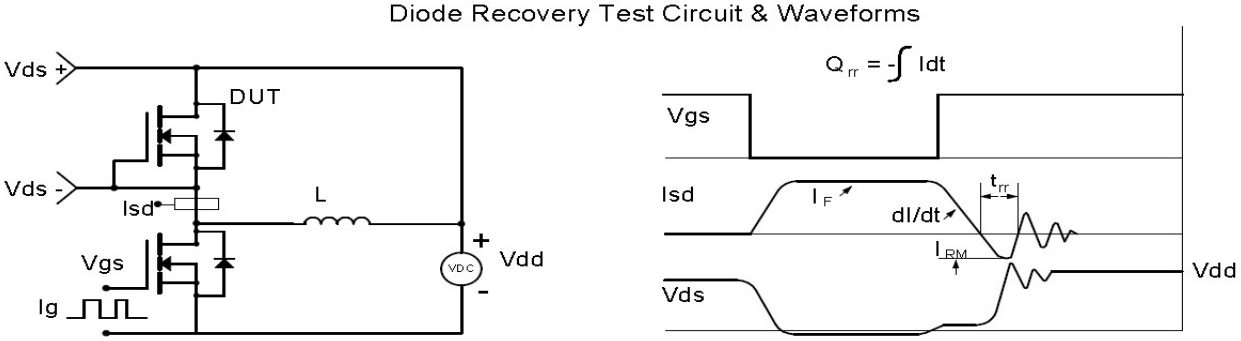

Resistive Switching Test Circuit & Waveforms




Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



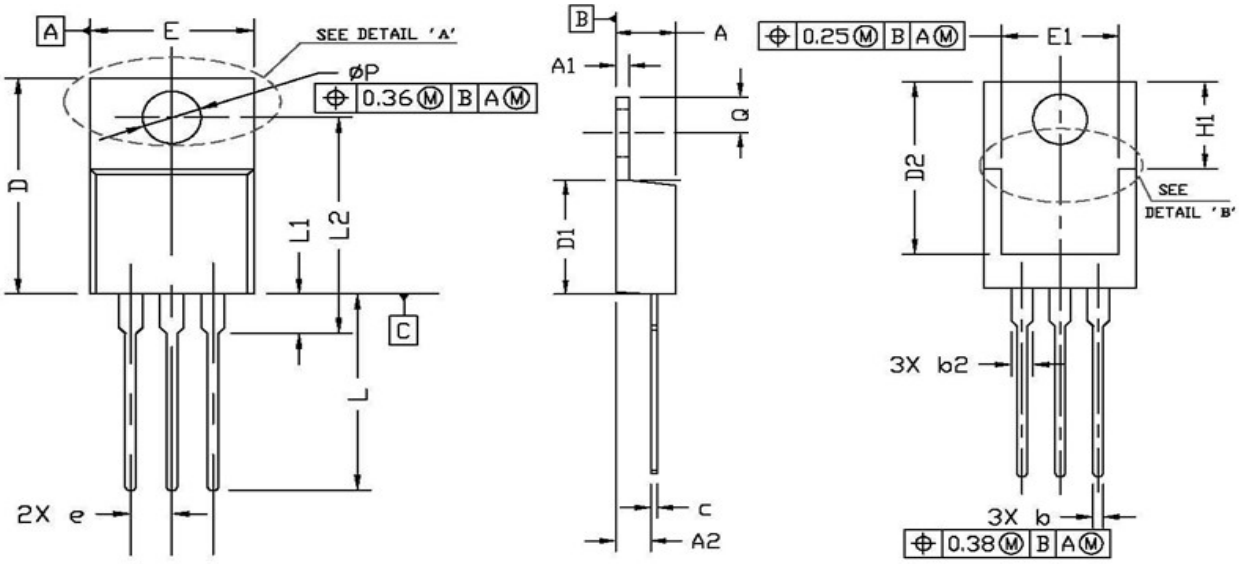

Diode Recovery Test Circuit & Waveforms

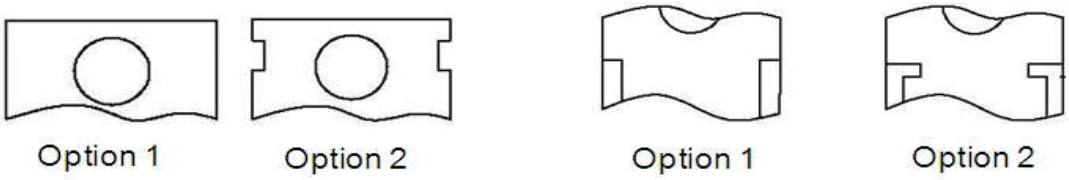




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## Package Outline:TO-220




Detail 'A' Detail 'B'

| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 4.30 | 4.80 | 0.169 | 0.189 |
| A1 | 1.20 | 1.45 | 0.047 | 0.057 |
| A2 | 2.20 | 2.90 | 0.087 | 0.114 |
| b | 0.69 | 0.95 | 0.027 | 0.037 |
| b2 | 1.00 | 1.60 | 0.039 | 0.063 |
| c | 0.33 | 0.65 | 0.013 | 0.026 |
| D | 14.70 | 16.20 | 0.579 | 0.638 |
| D1 | 8.59 | 9.65 | 0.338 | 0.380 |
| D2 | 11.75 | 13.60 | 0.463 | 0.535 |
| e | 2.54 BSC. | | 0.100 BSC. | |
| E | 9.60 | 10.60 | 0.378 | 0.417 |
| E1 | 7.00 | 8.89 | 0.276 | 0.350 |
| H1 | 6.20 | 7.00 | 0.244 | 0.276 |
| L | 12.60 | 14.80 | 0.496 | 0.583 |
| L1 | 2.70 | 3.80 | 0.106 | 0.150 |
| L2 | 12.13 | 16.50 | 0.478 | 0.650 |
| Q | 2.40 | 3.10 | 0.094 | 0.122 |
| P | 3.50 | 3.95 | 0.138 | 0.156 |


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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 | Date | Major changes |
|---|---|---|
| 1.1 | 2023/8/6 | Update package outline |

## 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.


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