## Features

- Uses CRM(CQ) advanced SkyMOS6 technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g$x$R_{DS(on)}$ product(FOM)
- Qualified according to JEDEC criteria

## Product Summary

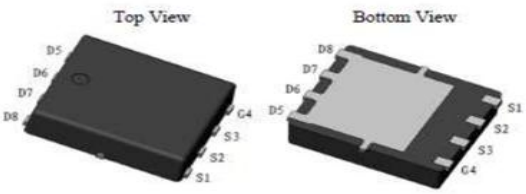
| | |
|---|---|
| $V_{DS}$ | 40V |
| $R_{DS(on).typ}$ | 0.49mΩ |
| $I_D$ | 430A |

***100% DVDS Tested***

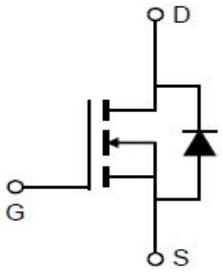
***100% Avalanche Tested***

## Applications

- High Switching Frequency DC–DC Conversion
- Synchronous Rectification




CRSM005N04L6Z




## Package Marking and Ordering Information

| Part # | Marking | Package | Packing | Reel Size | Tape Width | Qty |
|---|---|---|---|---|---|---|
| CRSM005N04L6Z | 005N04L6Z | PDFN5*6 | Tape&Reel | N/A | N/A | 4000pcs/ 5000pcs |

## Absolute Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-source voltage | $V_{DS}$ | 40 | V |
| Continuous drain current<br>$T_C$ = 25°C (Silicon limit)<br>$T_C$ = 100°C (Silicon limit) | $I_D$ | <br>430<br>320 | A |
| Pulsed drain current ($T_C$ = 25°C, $t_p$ limited by $T_{jmax}$) | $I_{D\ pulse}$ | 1720 | A |
| Avalanche energy, single pulse ($I_D$ = 65A, Rg=25Ω)[1] | $E_{AS}$ | 1056 | mJ |
| Gate-Source voltage | $V_{GS}$ | ±20 | V |
| Power dissipation ($T_C$ = 25°C) | $P_{tot}$ | 210 | W |
| Operating junction and storage temperature | $T_j$ , $T_{stg}$ | -55...+175 | °C |
| Soldering temperature, wave soldering only allowed at leads (1.6mm from case for 10s) | Tsold | 260 | °C |

※. Notes:

1.EAS is tested at starting Tj = 25℃, L = 0.5mH, IAS =65A, VGS = 10V.

## Thermal Resistance

| Parameter | Symbol | Max | Unit |
|---|---|---|---|
| Thermal resistance, junction – case. | $R_{thJC}$ | 0.71 | °C/W |
| Thermal resistance, junction – ambient(min. footprint) | $R_{thJA}$ | 40 | |

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

| Parameter | Symbol | Value | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | min. | typ. | max. | | |
| **Static Characteristic** | | | | | | |
| Drain-source breakdown voltage | $BV_{DSS}$ | 40 | - | - | V | $V_{GS}$=0V, $I_D$=250uA |
| | | 40 | - | - | V | $V_{GS}$=0V, $I_D$=1mA |
| Gate threshold voltage | $V_{GS(th)}$ | 1.0 | 1.8 | 3.0 | V | $V_{DS}$=$V_{GS}$,$I_D$=250uA |
| Zero gate voltage drain current | $I_{DSS}$ | -<br>- | -<br>- | 1<br>100 | μA | $V_{DS}$=40V,$V_{GS}$=0V<br>$T_j$=25°C<br>$T_j$=125°C |
| Gate-source leakage current | $I_{GSS}$ | 0 | - | ±100 | nA | $V_{GS}$=±20V,$V_{DS}$=0V |
| Drain-source on-state resistance | $R_{DS(on)}$ | - | 0.49 | 0.59 | mΩ | VGS=10V, ID=60A |
| Transconductance | $g_{fs}$ | - | 430.3 | - | S | $V_{DS}$=5V, $I_D$=50A |
| **Dynamic Characteristic** | | | | | | |
| Input Capacitance | $C_{iss}$ | - | 8043 | - | pF | $V_{GS}$=0V, $V_{DS}$=20V, f=1MHz |
| Output Capacitance | $C_{oss}$ | - | 2211 | - | | |
| Reverse Transfer Capacitance | $C_{rss}$ | - | 92 | - | | |
| Gate Total Charge | $Q_G$ | - | 128.7 | - | nC | $V_{GS}$=10V, $V_{DS}$=20V, $I_D$=50A |
| Gate-Source charge | $Q_{gs}$ | - | 34.5 | - | | |
| Gate-Drain charge | $Q_{gd}$ | - | 21.0 | - | | |
| Turn-on delay time | $t_{d(on)}$ | - | 22.2 | - | ns | $V_{GS}$=10V, $V_{DD}$=20V, $R_{G_ext}$=2.5Ω |
| Rise time | $t_r$ | - | 84.1 | - | | |
| Turn-off delay time | $t_{d(off)}$ | - | 82.1 | - | | |
| Fall time | $t_f$ | - | 21.9 | - | | |
| Gate resistance | $R_G$ | - | 1.3 | - | 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 | $V_{SD}$ | - | 0.8 | 1.2 | V | $V_{GS}$=0V,$I_{SD}$=60A |
| Body Diode Reverse Recovery Time | $t_{rr}$ | - | 65.3 | - | ns | $I_F$=50A,dI/dt=100A/μs |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | - | 109.8 | - | nC | |

## Typical Performance Characteristics

Fig 1: Output Characteristics

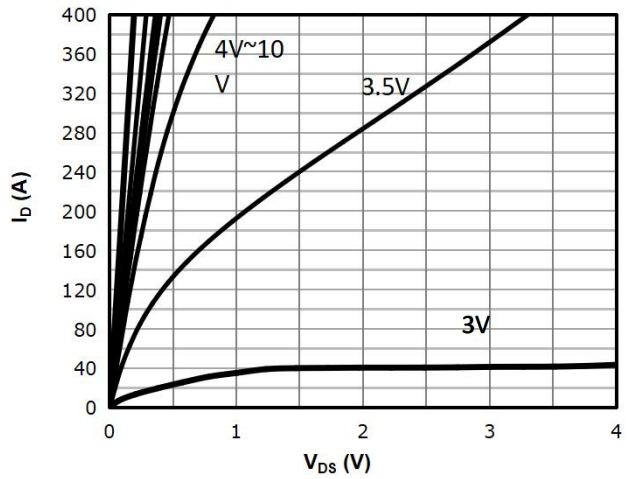



Fig 2: Transfer Characteristics

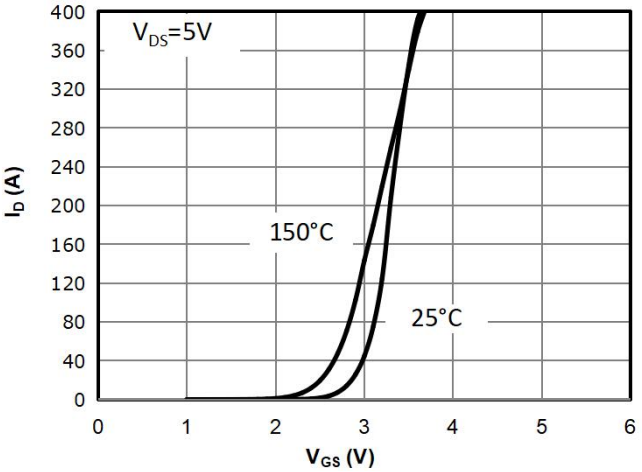



Fig 3: Rds(on) vs Drain Current and Gate Voltage

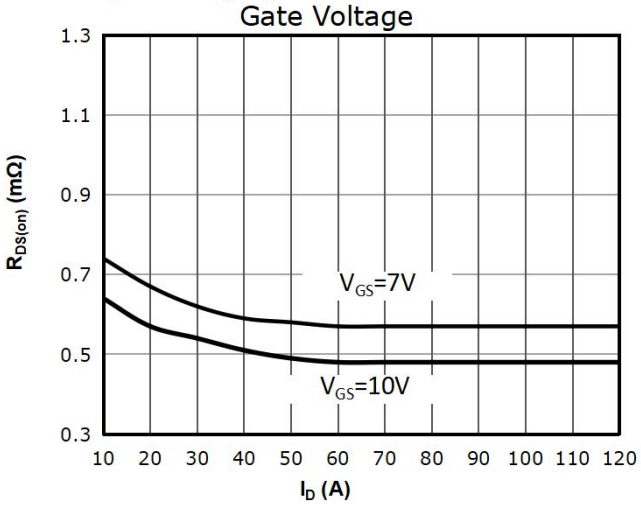



Fig 4: Rds(on) vs Gate Voltage

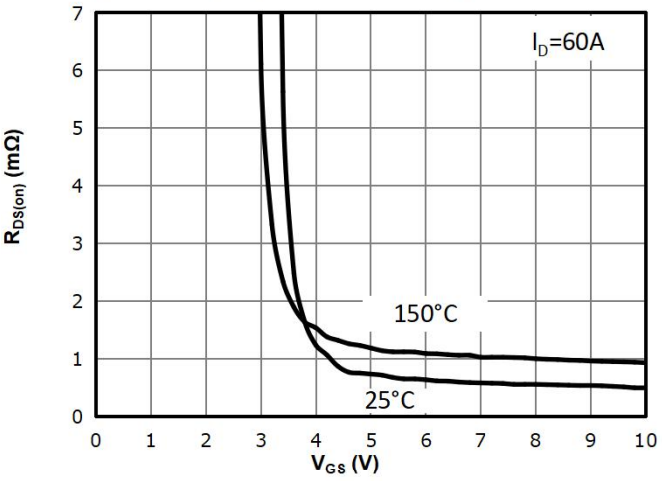



Fig 5: Rds(on) vs. Temperature

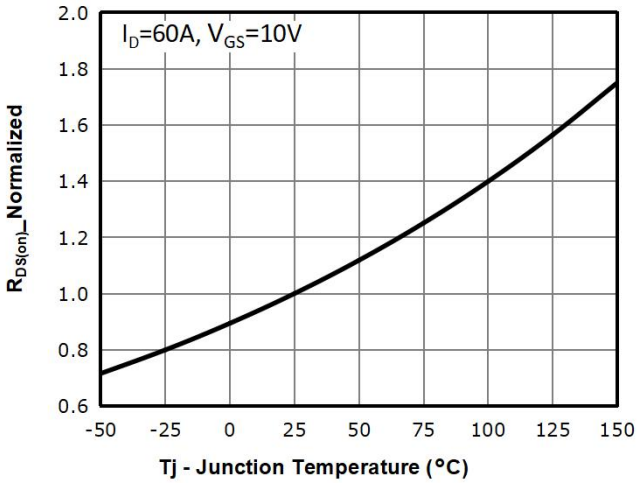



Fig 6: Vgs(th) vs. Temperature

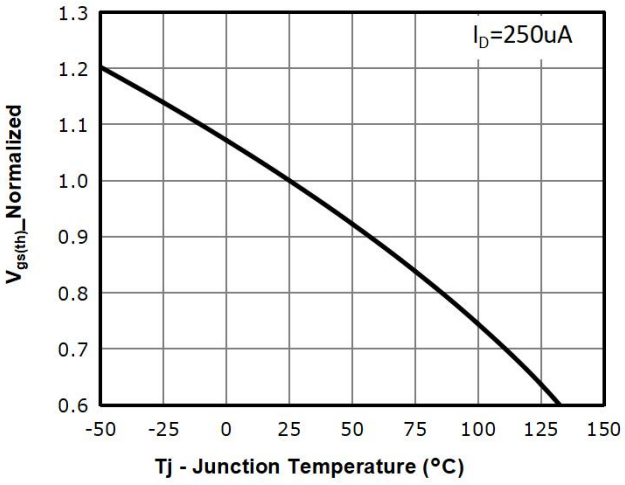


Fig 7: BVdss vs. Temperature

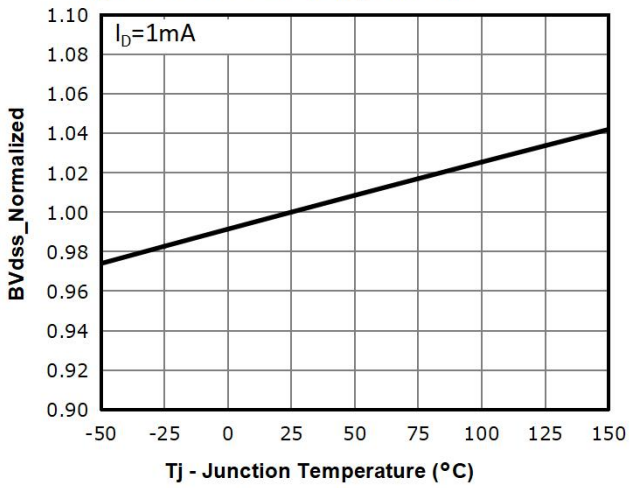



Fig 8: Capacitance Characteristics

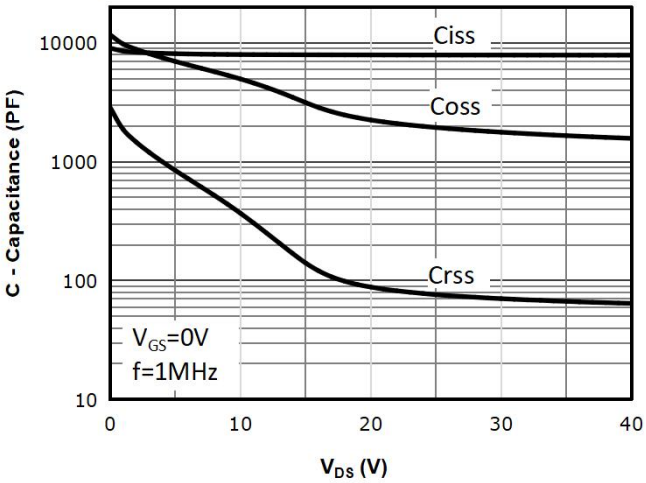



Fig 9: Gate Charge Characteristics

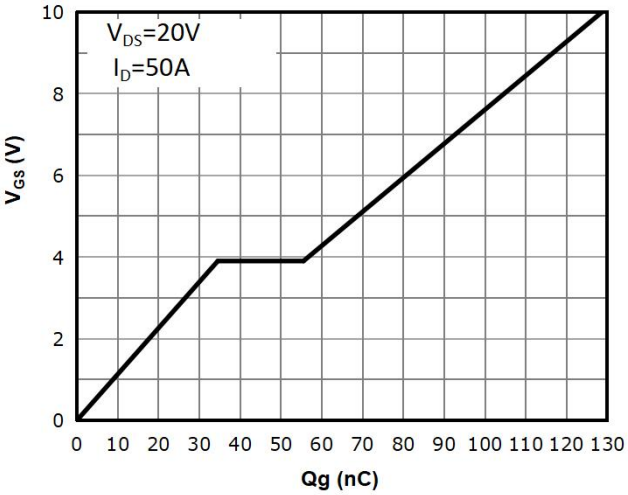



Fig 10: Body-diode Forward Characteristics

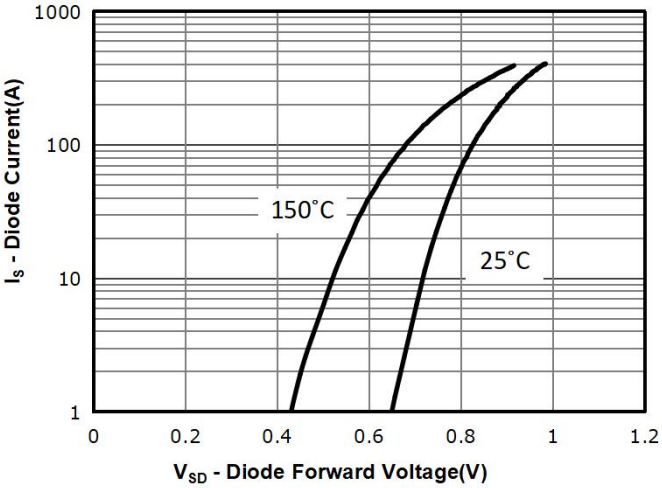



Fig 11: Power Dissipation

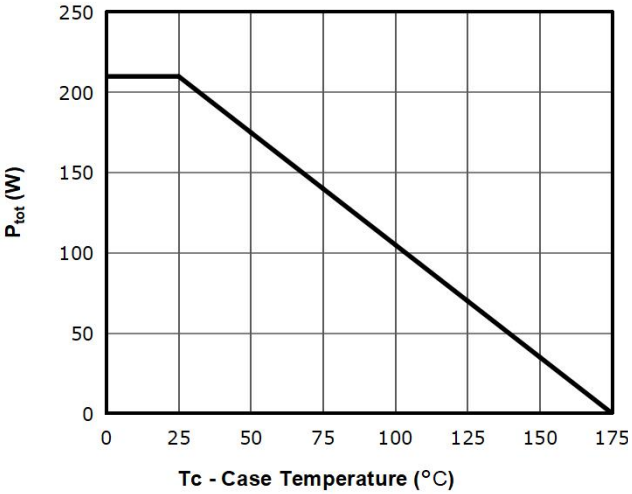



Fig 12: Drain Current Derating

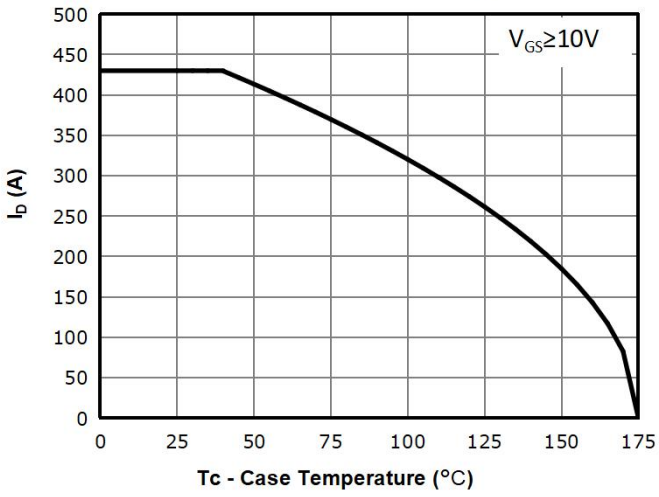


Fig 13: Safe Operating Area

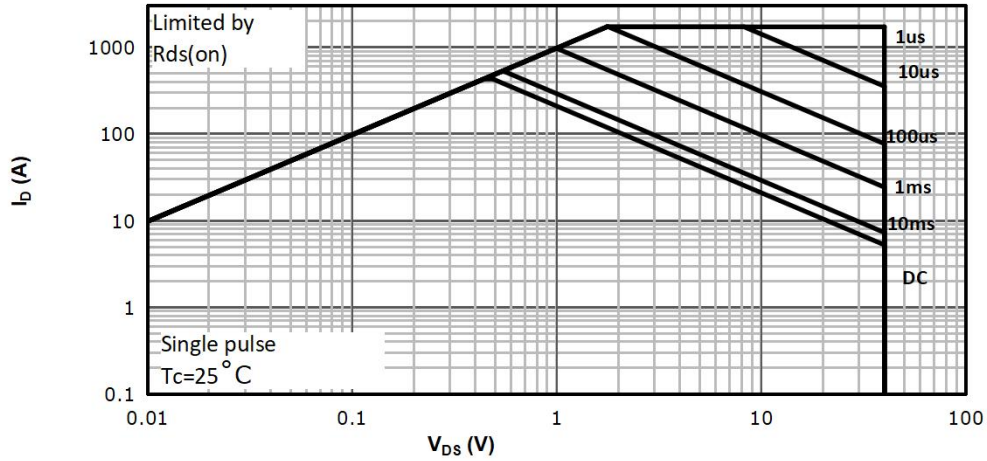
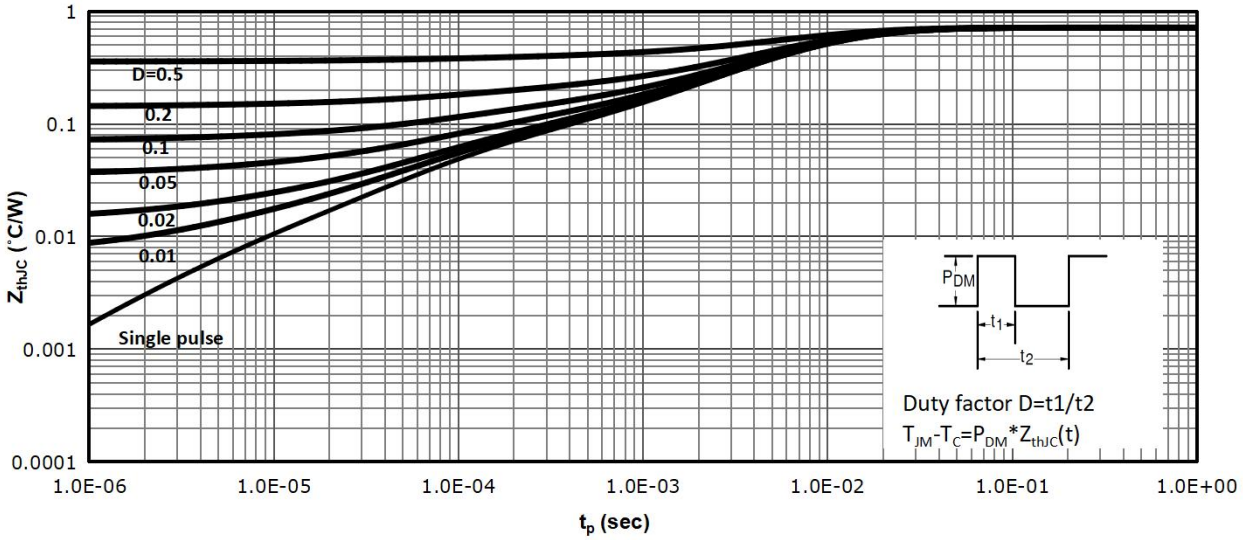
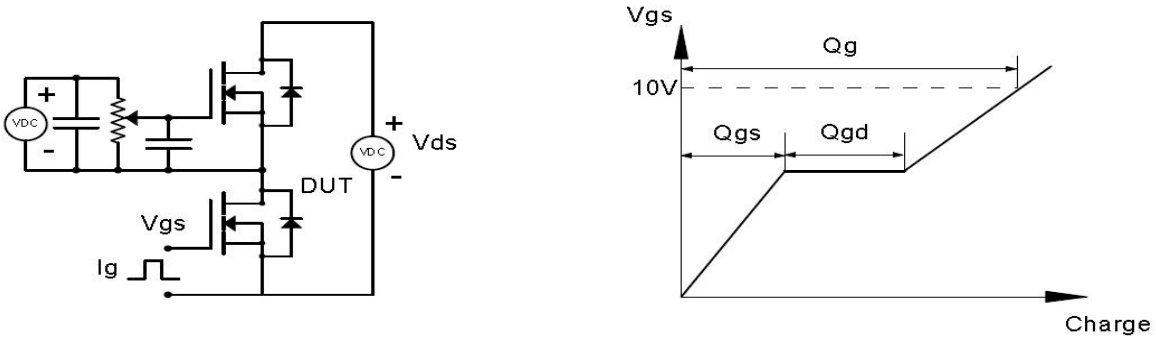



Fig 14: Max. Transient Thermal Impedance

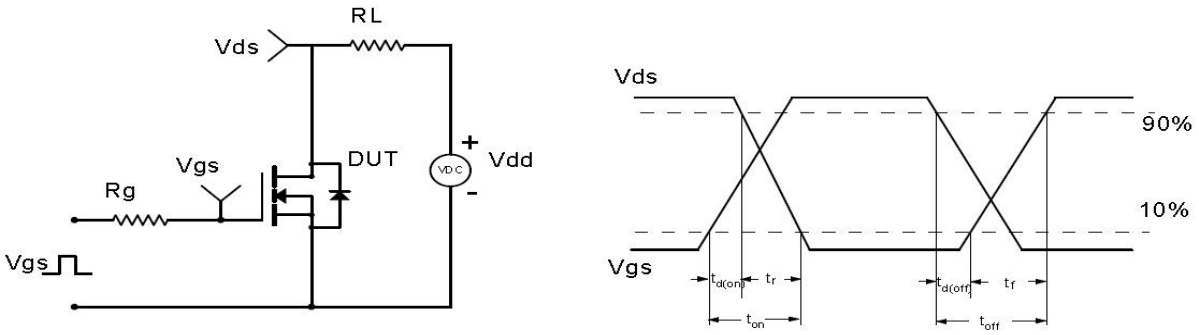


## Test Circuit & Waveform

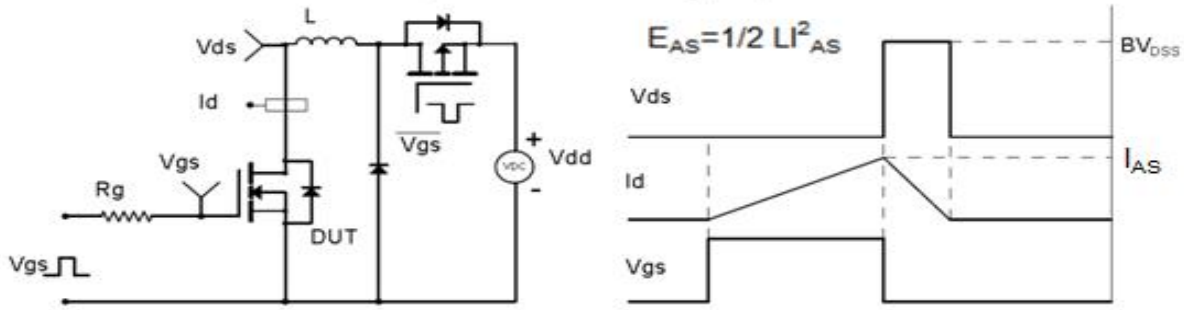
Gate Charge Test Circuit & Waveform



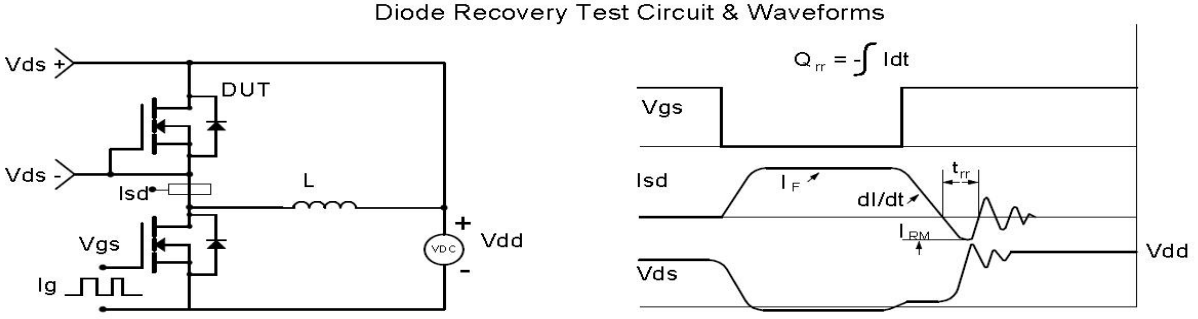

Resistive Switching Test Circuit & Waveforms



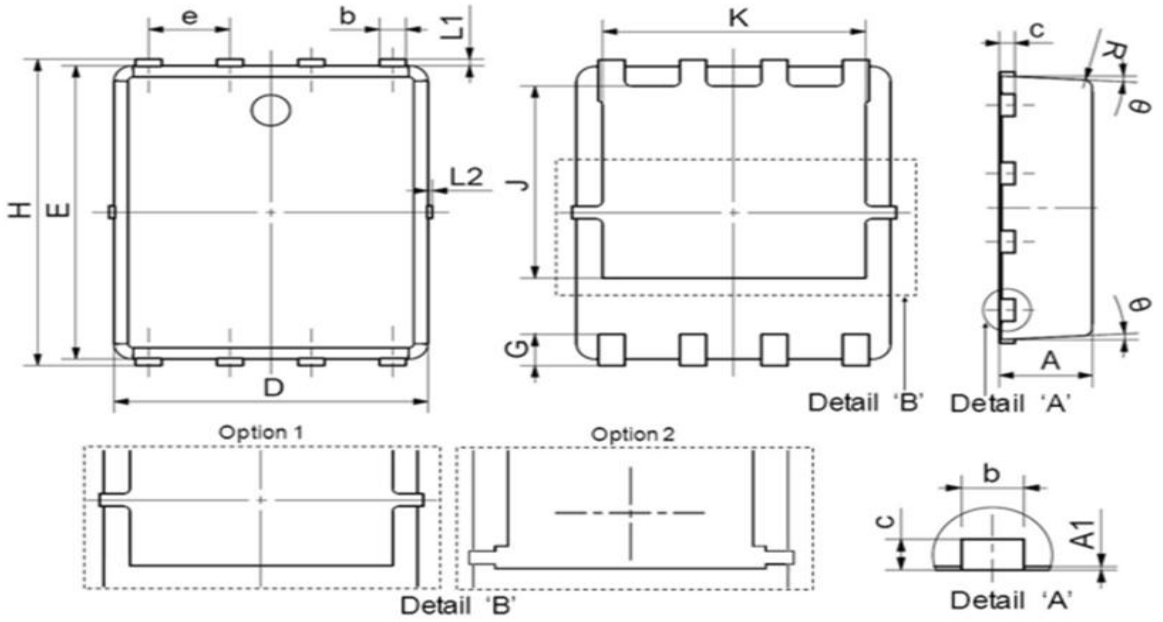

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms




Diode Recovery Test Circuit & Waveforms

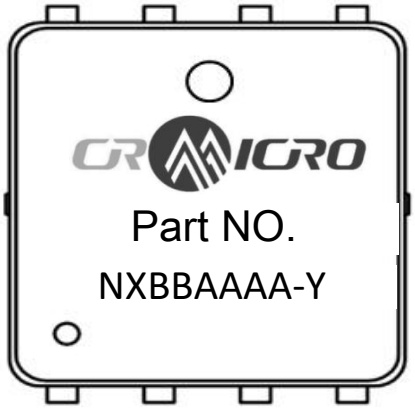


## Package Outline: PDFN5*6




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 0.80 | 1.20 | 0.031 | 0.047 |
| A1 | 0.00 | 0.05 | 0.000 | 0.002 |
| b | 0.30 | 0.51 | 0.012 | 0.020 |
| c | 0.15 | 0.35 | 0.006 | 0.014 |
| D | 4.80 | 5.40 | 0.189 | 0.213 |
| e | 1.27 BSC | | 0.050 BSC | |
| E | 5.65 | 6.06 | 0.222 | 0.239 |
| G | 0.30 | 0.86 | 0.012 | 0.034 |
| H | 5.90 | 6.35 | 0.232 | 0.250 |
| J | 3.25 | 3.92 | 0.128 | 0.154 |
| K | 3.61 | 4.40 | 0.142 | 0.173 |
| L1 | 0.05 | 0.25 | 0.002 | 0.010 |
| L2 | 0.00 | 0.22 | 0.000 | 0.009 |
| R | 0.25 REF | | 0.010 REF | |
| θ | 0° | 14° | 0° | 12° |

## Marking




NOTE:
NXBBAAAA-Y

| | |
|---|---|
| N | —Wire Bond code |
| X | —Assembly location code |
| BB | —Fab code |
| AAAA | —Lot code |
| Y | —Bin code |

## Revision History

| Revision | Date | Major changes |
|---|---|---|
| 1.0 | 2025/5/8 | Release of Preliminary version. |

## Disclaimer

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