# CRXSP40M065G4Z

SiC MOSFET 750V, 40m Ω , 42A

## Features

- CRM G4 SIC MOSFET Technology
- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Avalanche Ruggedness
- Fast Reverse Recovery
- Qualified according to JEDEC criteria

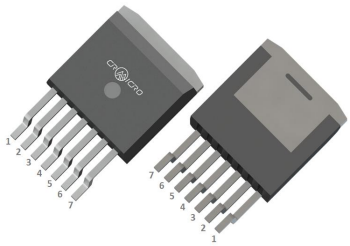
## Product Summary

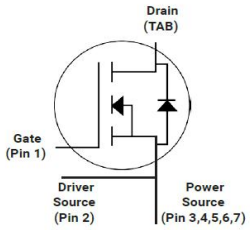
| | |
|---|---|
| VDS | 750V |
| $R_{DS(on)_typ}$ | 40m Ω |
| $I_D$ | 42A |

## Applications

- Switching Mode Power Supply(SMPS)
- High Voltage DC/DC Converters
- On Board Charger(OBC)
- EV Charger

***100% Avalanche Tested***






## Package Marking and Ordering Information

| Part # | Marking | Package | Packing | Qty |
|---|---|---|---|---|
| CRXSP40M065G4Z | X45M065G4Z | TO-263-7 | Reel | 800pcs |

## Absolute Maximum Ratings

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-source voltage | $V_{DS}$ | 750 | V |
| Continuous drain current<br>$V_{GS}$=18V， $T_C$ = 25°C<br>$V_{GS}$=18V， $T_C$ = 100°C | $I_D$ | <br>42<br>30 | A |
| Pulsed drain current ($T_C$ = 25°C, $t_p$ limited by $T_{jmax}$) | $I_{D(pulse)}$ | 105 | A |
| Avalanche energy, single pulse (L=10mH, Rg=25Ω) | $E_{AS}$ | 490 | mJ |
| Gate-Source voltage (dynamic)[a1] | $V_{GSmax}$ | -10/+22 | V |
| Gate-Source voltage (static)[a2] | $V_{GSop}$ | -5/+18 | V |
| Power dissipation ($T_C$=25°C,$T_J$=175°C) | $P_D$ | 150 | W |
| Operating Junction and Storage Temperature | $T_j$,$T_{stg}$ | -55...175 | °C |

a1: When using MOSFET Body Diode $V_{GSmax}$ = -5V/+22V

a2: MOSFET can also safely operate at 0/+18V

## Thermal Resistance

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Thermal resistance, junction – case. Max | $R_{thJC}$ | 1.0 | °C/W |
| Thermal resistance, junction – ambient. Max | $R_{thJA}$ | 50 | |

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

| Parameter | Symbol | Value | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | min. | typ. | max. | | |
| **Static Characteristic** | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | 750 | - | - | V | $V_{GS}$=0V, $I_D$=250uA |
| Gate threshold voltage | $V_{GS(th)}$ | 2 | - | 4 | V | $V_{DS}$=$V_{GS}$,$I_D$=6mA |
| Zero gate voltage drain current | $I_{DSS}$ | - | 0.1 | 100 | μA | VDS=650V,VGS=0V<br>$T_j$=25°C |
| | | - | 1 | - | | $T_j$=175°C |
| Gate-source leakage current | $I_{GSS}$ | - | - | ±100 | nA | $V_{GS}$=-10/+22V,$V_{DS}$=0V |
| Drain-source on-state resistance | $R_{DS(on)}$ | - | 50 | 65 | mΩ | VGS=15V, ID=14A,<br>$T_j$=25°C |
| | | - | 60 | - | | $T_j$=175°C |
| Drain-source on-state resistance | $R_{DS(on)}$ | - | 40 | 53 | mΩ | VGS=18V, ID=14A,<br>$T_j$=25°C |
| | | - | 52 | - | | $T_j$=175°C |
| Transconductance | $g_{fs}$ | - | 12 | - | S | VDS=20V,IDS=14A |
| **Dynamic Characteristic** | | | | | | |
| Internal Gate resistance | $R_{G(int)}$ | - | 3.1 | - | Ω | f=1MHz |
| Input Capacitance | $C_{iss}$ | - | 1196 | - | pF | $V_{GS}$=0V, $V_{DS}$=650V, f=1MHz |
| Output Capacitance | $C_{oss}$ | - | 94 | - | | |
| Reverse Transfer Capacitance | $C_{rss}$ | - | 3.0 | - | | |
| Coss Stored Energy | $E_{oss}$ | - | 23.4 | - | uJ | |
| Gate Total Charge | $Q_g$ | - | 47 | - | nC | VGS=-5/18V<br>VDS=400V<br>ID=14A |
| Gate-Source charge | $Q_{gs}$ | - | 15 | - | | |
| Gate-Drain charge | $Q_{gd}$ | - | 10 | - | | |
| Turn-on delay time | $t_{d(on)}$ | - | 4.2 | - | ns | VDD=400V,ID=14A<br>VGS=-5V/18V，<br>RG=2.5 Ω， L=120uH |
| Rise time | $t_r$ | - | 9 | - | | |
| Turn-off delay time | $t_{d(off)}$ | - | 18.2 | - | | |
| Fall time | $t_f$ | - | 11.5 | - | | |
| Turn-On Switching Energy | $E_{(on)}$ | - | 70.4 | - | uJ | |
| Turn Off Switching Energy | $E_{(off)}$ | - | 7.3 | - | | |

## Body Diode Characteristic

| Parameter | Symbol | Value | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | min. | typ. | max. | | |
| Body Diode Forward Voltage | $V_{SD}$ | - | 3.6 | - | V | VGS=0V,IF=7A |
| | | - | 3 | - | V | VGS=0V,IF=7A, Tj=175℃ |
| Continuous Diode Forward Current | $I_S$ | - | - | 42 | A | $V_{GS}$=0V |
| Diode pulse Current | $I_{S,pulse}$ | - | - | 105 | A | pulse width $t_p$ limited by Tjmax |
| Body Diode Reverse Recovery Time | $t_{rr}$ | - | 17 | - | ns | di/dt=1000A/us IF=14A Vdd=400V Tj=25℃ |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | - | 110 | - | nC | |
| Body Diode Peak Reverse Recovery Current | $I_{rrm}$ | - | 10.4 | - | A | |
| Body Diode Reverse Recovery Time | $t_{rr}$ | - | 16.3 | - | ns | di/dt=1000A/us IF=14A Vdd=400V, Tj=175℃ |
| Body Diode Reverse Recovery Charge | $Q_{rr}$ | - | 110 | - | nC | |
| Body Diode Peak Reverse Recovery Current | $I_{rrm}$ | - | 10.9 | - | A | |

## Typical Performance Characteristics

**Fig 1. Output Characteristics (Tj=-55℃)**

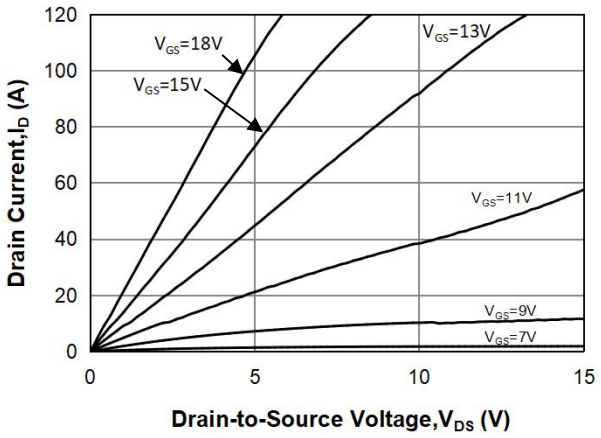



**Fig 2. Output Characteristics (Tj=25℃)**

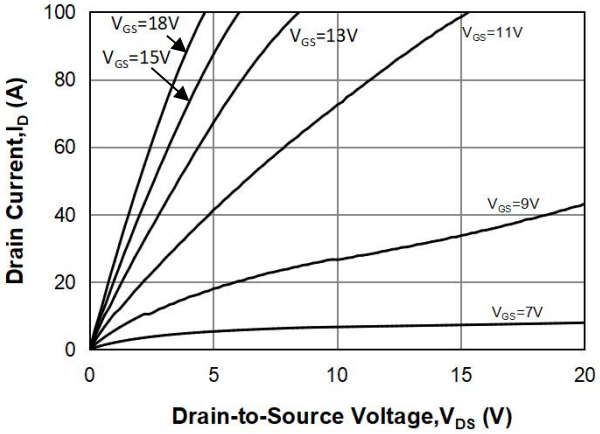



**Fig 3. Output Characteristics (Tj=175℃)**

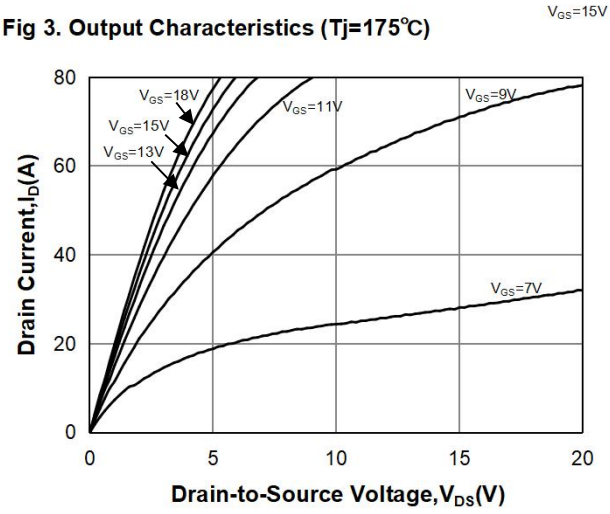



**Fig 4: Rds(on) vs. Temperature**

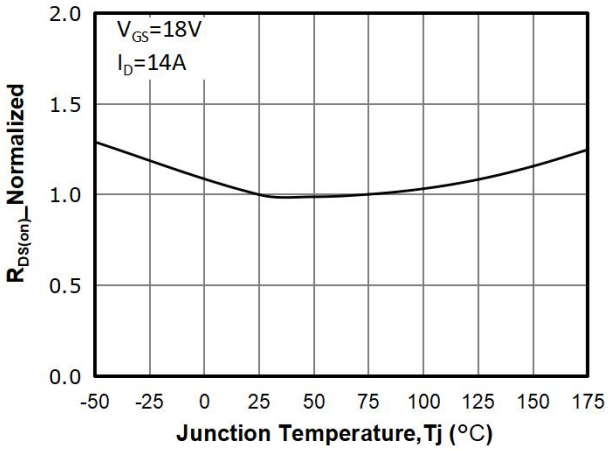



**Fig 5: On-Resistance vs. Drain Current For Various Temperatures**

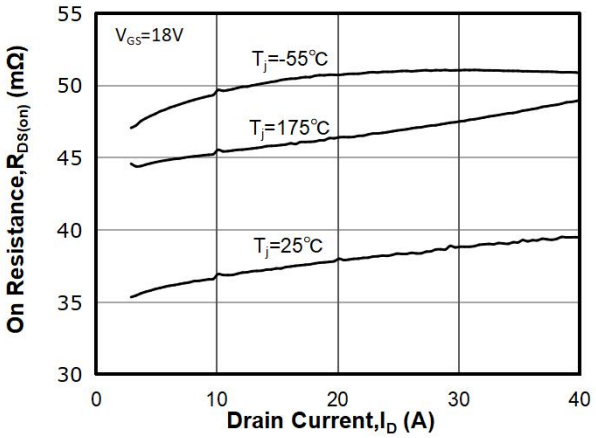



**Fig 6: Rds(on) vs. Temperature For Various Gate Voltage**

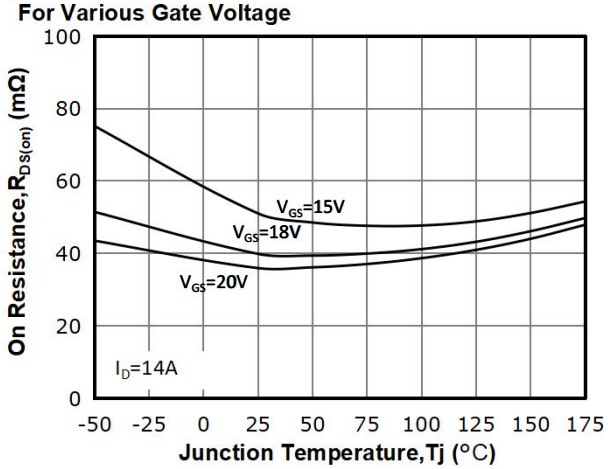


**Fig 7: Transfer Characteristics**

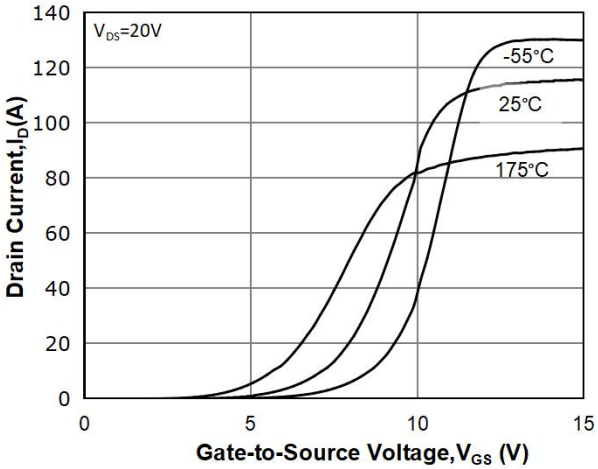



**Fig 8: Body-diode Forward Characteristics For Various Temperatures**

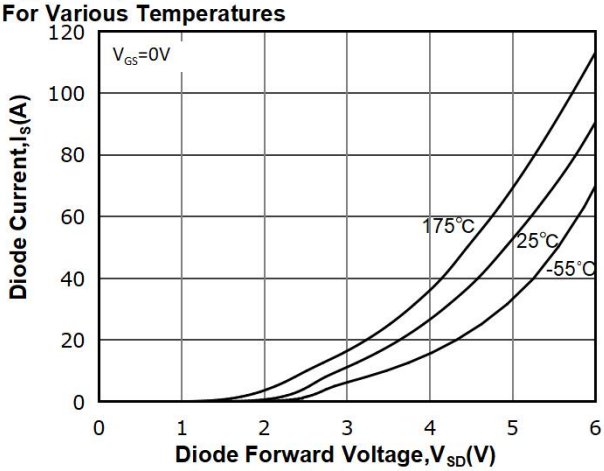



**Fig 9: VGS(th) Vs Tj Characteristics**

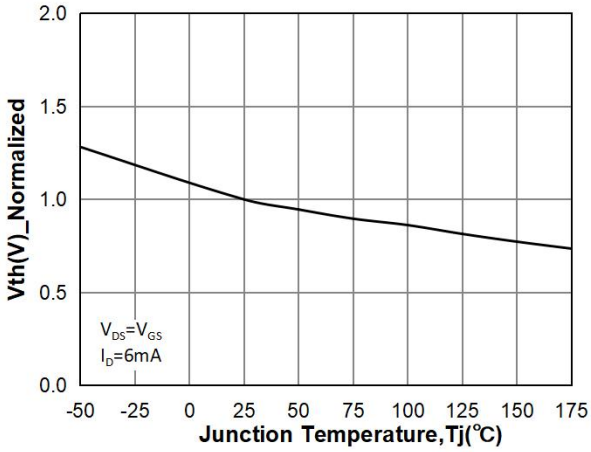



**Fig 10: 3rd Quadrant Characteristic at 25℃**

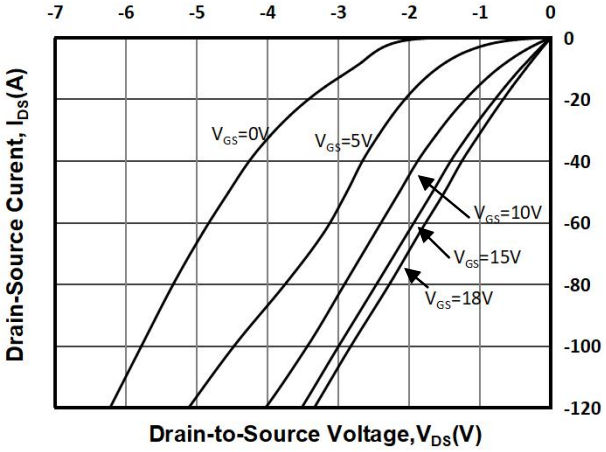



**Fig 11：Gtate Charge Characteristics**

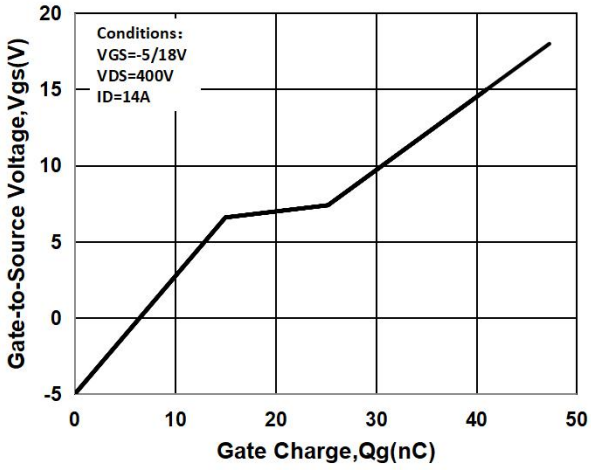



**Fig 12: Capacitance Characteristics**

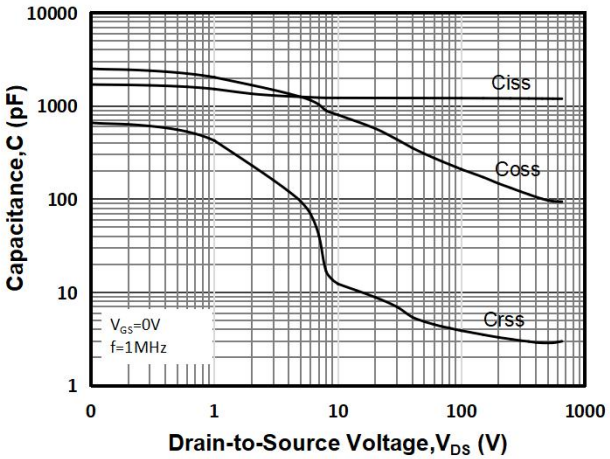


**Fig 13: Continuous Drain Current vs. Case Temperature**

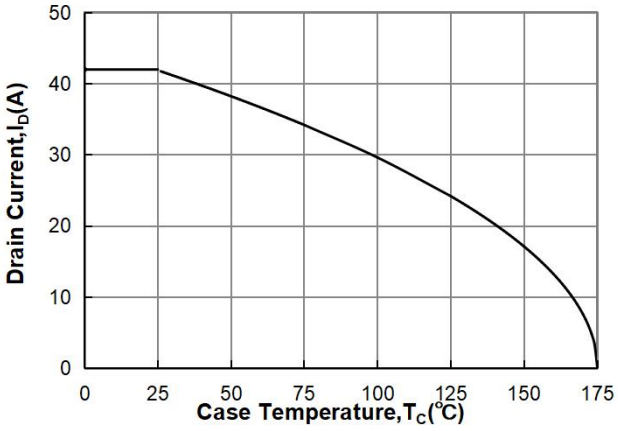



**Fig 14: Maximum Power Dissipation vs. Case Temperature**

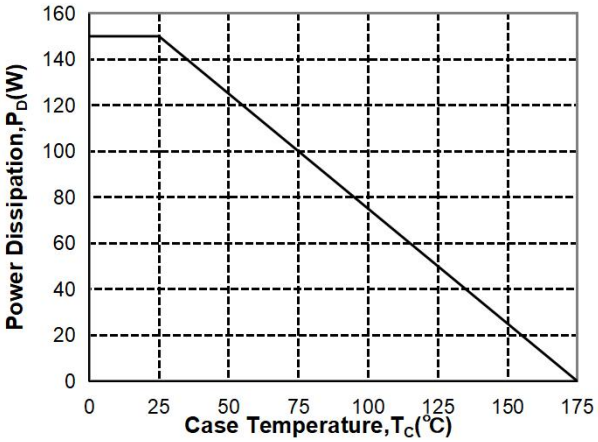



**Fig 15: Safe Operating Area**

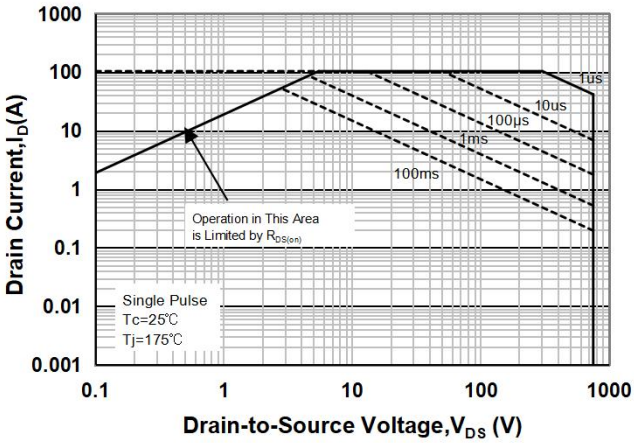



**Fig 16:Output Capacitor Stored Energy**

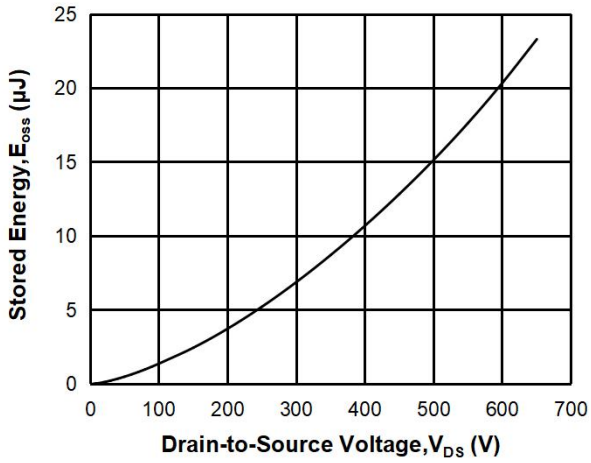



**Fig 17: Max. Transient Thermal Impedance**

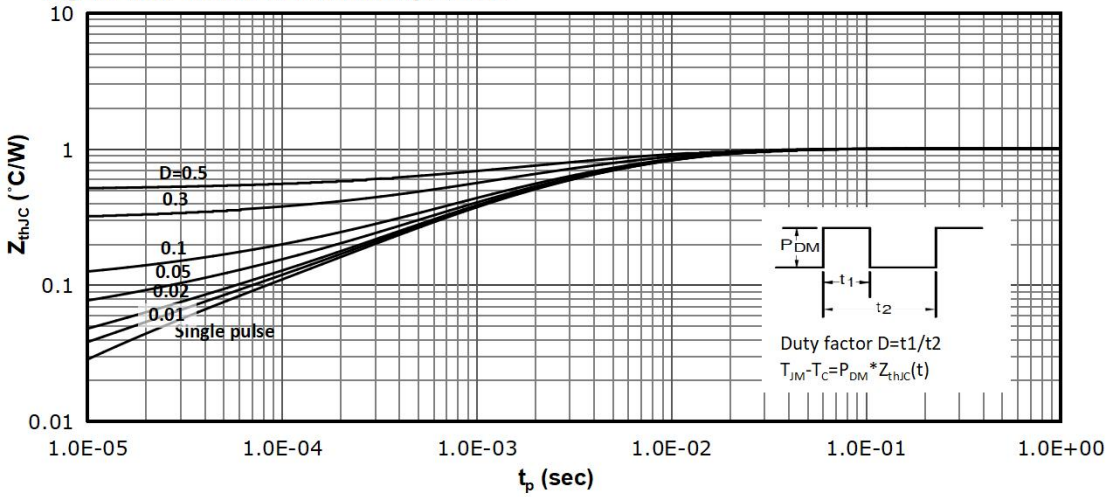


**Fig 18: Rg(Ω) vs. Switching Times(us)**

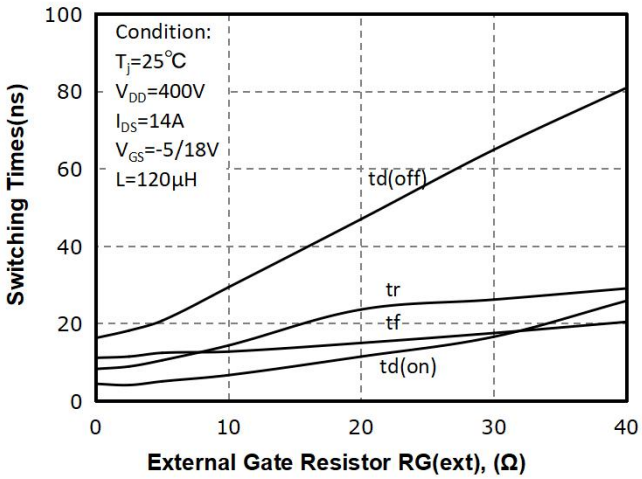



**Fig 19: Rg(Ω) vs. Switching Loss(uJ)**

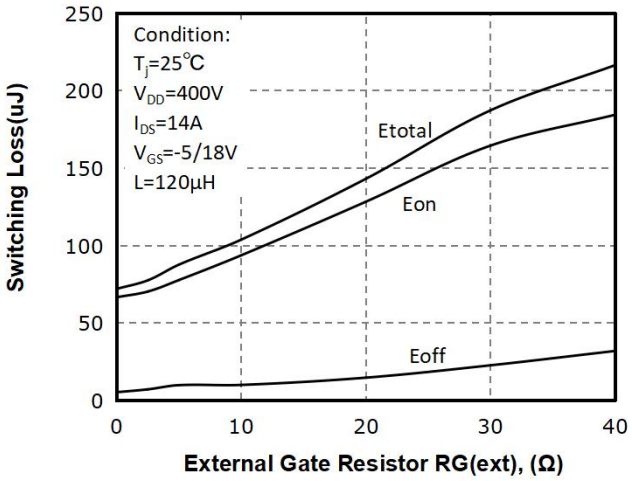



**Fig 20: Temperature(°C) vs. Switching Loss(uJ)**

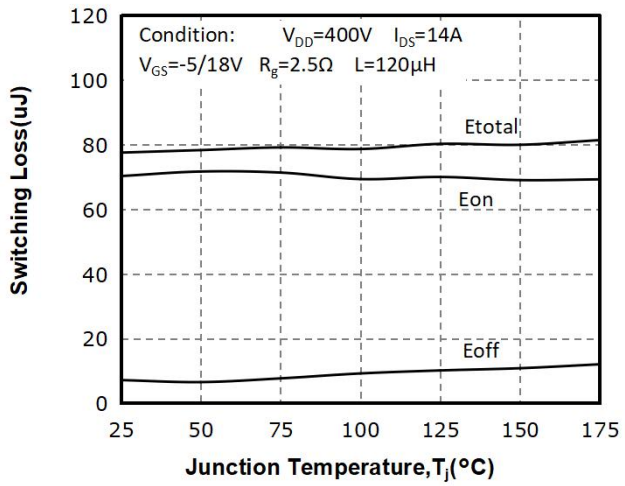
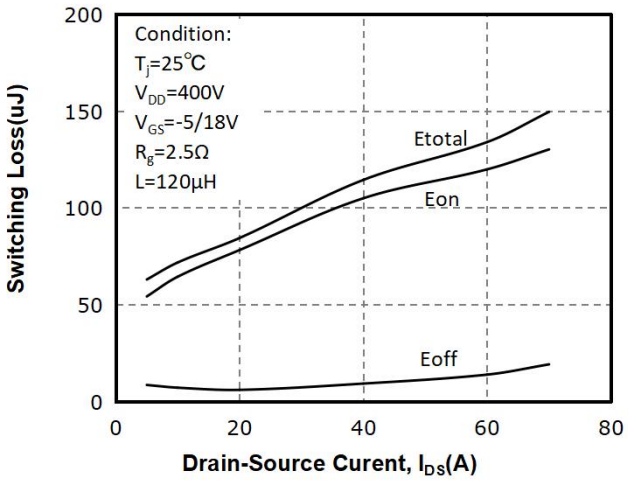
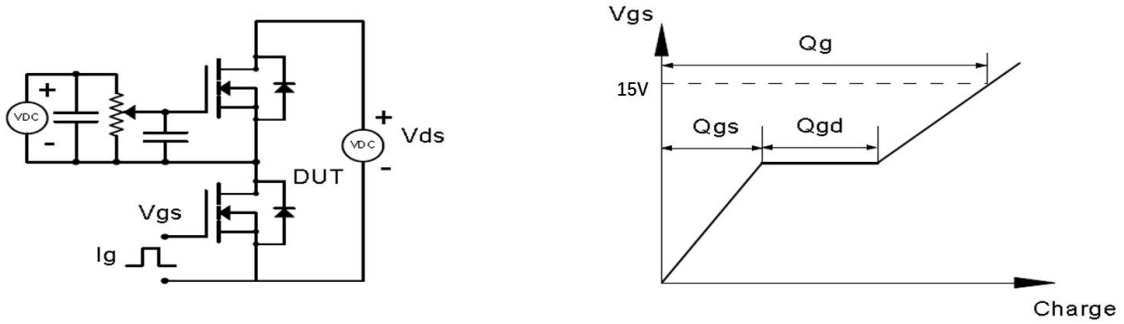



**Fig 21: $I_{DS}$(A) vs. Switching Loss(uJ)**

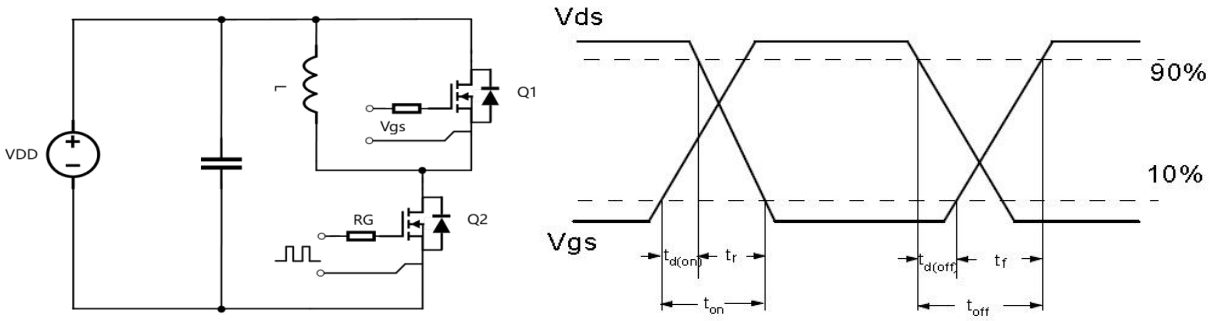


## Test Circuit & Waveform

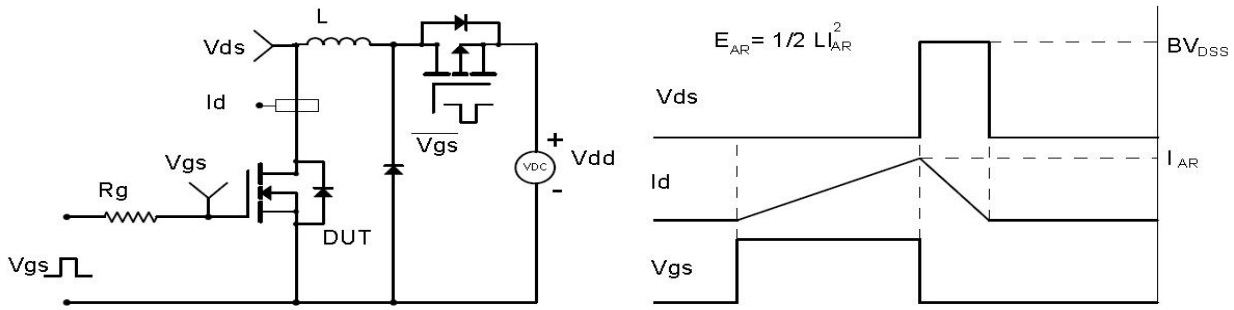
Gate Charge Test Circuit & Waveform



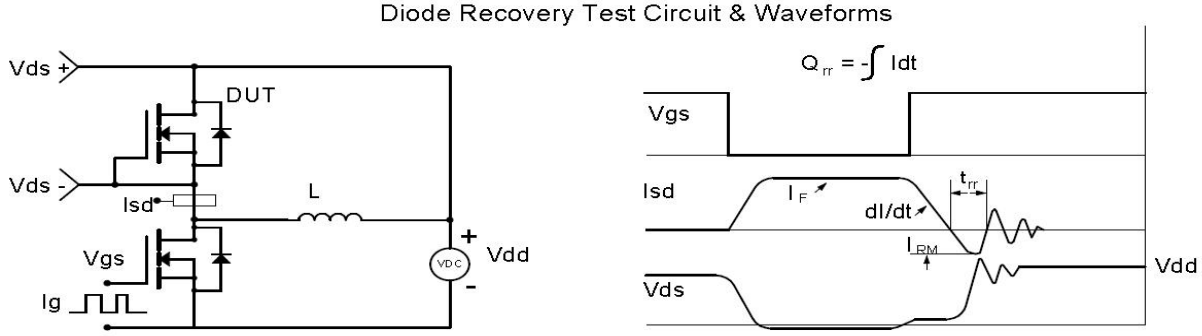

Resistive Switching Test Circuit & Waveforms



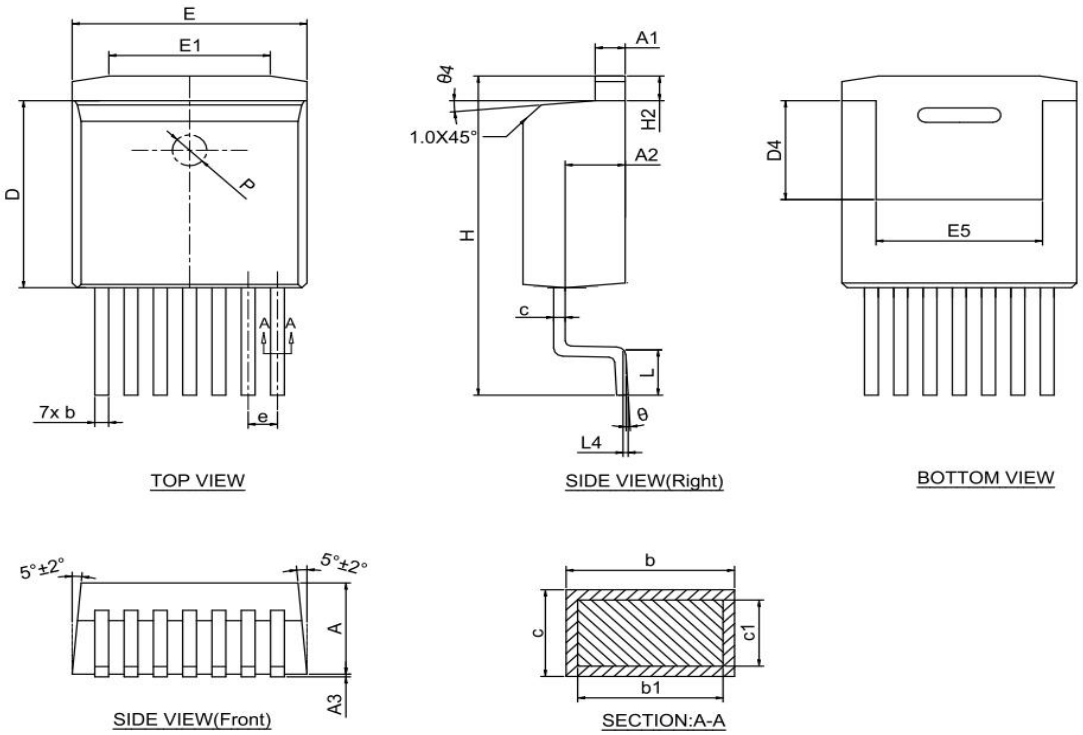

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms




Diode Recovery Test Circuit & Waveforms



## Package Outline: TO-263-7




| Items | Values(mm) | |
|---|---|---|
| | MIN | MAX |
| A | 4.2 | 4.66 |
| A1 | 1.15 | 1.45 |
| A2 | 2.35 | 2.85 |
| A3 | 0 | 0.3 |
| b | 0.5 | 0.78 |
| b1 | 0.45 | 0.75 |
| c | 0.49 | 0.64 |
| c1 | 0.4 | 0.6 |
| D | 8.83 | 9.33 |
| D4 | 4.6 | 5 |
| e | 1.27 BSC. | |
| E | 9.08 | 10.38 |
| E1 | 6.4 | 7.6 |
| E5 | 6.72 | 7.72 |
| H | 14.9 | 16.1 |
| H2 | 0.9 | 1.45 |
| L | 1.8 | 2.6 |
| L4 | 0.25 BCS. | |
| P | 1.4 | 1.6 |
| θ | 0° | 7° |

## Revision History

| Revison | Date | Major changes |
|---|---|---|
| 1.0 | 2026/5/8 | Release of formal version |
| | | |
| | | |

## 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 reserves the right to improve product design, function and reliability without notice.