# CMD65R580/CMU65R580

650V N-Channel Super Junction Power MOSFET

## General Description

The 65R580 series use advanced MOSFET technology to provide low R DS(ON), low gate charge, fast switching and excellent avalanche characteristics. This device is suitable for active power factor correction and switching mode power supply applications.

## Product Summary

| BVDSS | RDSON | ID |
|---|---|---|
| 650V | 0.62Ω | 8A |

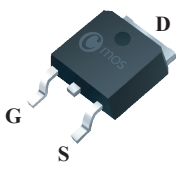
## Applications

- Power Supply
- PFC
- Switching Applications

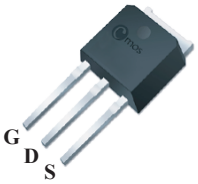
## Features

- Multi-layer Epitaxial Chip Technology
- Low On-Resistance
- 100% Avalanche Tested
- RoHS Compliant

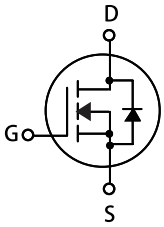
## TO-252/251 Pin Configuration




TO-252
(CMD65R580)




TO-251
(CMU65R580)




## Absolute Maximum Ratings

$T_C$ = 25°C unless otherwise noted

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| $V_{DSS}$ | Drain-Source Voltage | 650 | V |
| $I_D$ | Drain Current - Continuous ($T_C$ = 25°C) | 8 | A |
| | - Continuous ($T_C$ = 100°C) | 5 | A |
| $I_{DM}$ | Drain Current - Pulsed | 24 | A |
| $V_{GSS}$ | Gate-Source Voltage | ±30 | V |
| $E_{AS}$ | Single Pulse Avalanche Energy [1] | 170 | mJ |
| $P_D$ | Power Dissipation ($T_C$ = 25°C) | 45 | W |
| $T_J$, $T_{STG}$ | Operating and Storage Temperature Range | -55 to +150 | °C |

## Thermal Characteristics

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case Max. | 2.75 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient Max | 62.5 | °C/W |

## Electrical Characteristic

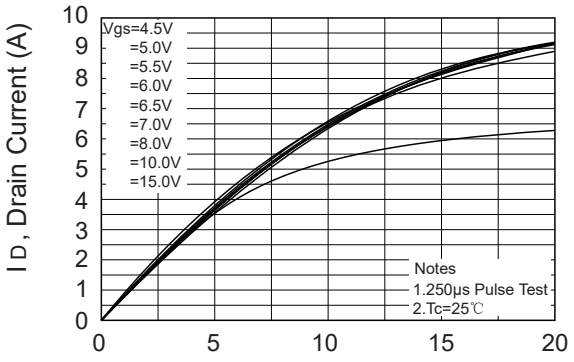
$T_C$ = 25°C unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$ = 0 V, $I_D$ = 250 µA | 650 | -- | -- | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = 600 V, $V_{GS}$ = 0 V | -- | -- | 1 | uA |
| $I_{GSSF}$ | Gate-Body Leakage Current, Forward | $V_{GS}$ = ±30V, $V_{DS}$ = 0 V | -- | -- | ±100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 µA | 2 | -- | 4 | V |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance | $V_{GS}$ = 10 V, $I_D$ = 2.5A | -- | 0.55 | 0.62 | Ω |
| $R_G$ | Gate resistance | f=1MHz, open drain | -- | 27 | -- | Ω |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 25V, $V_{GS}$ = 0 V, f = 1.0 MHz | -- | 500 | -- | pF |
| $C_{oss}$ | Output Capacitance | | -- | 430 | -- | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | -- | 25 | -- | pF |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DS}$ = 300 V , $V_{GS}$=10V, $I_D$ = 8A, $R_G$ = 25Ω | -- | 15 | -- | ns |
| $t_r$ | Turn-On Rise Time | | -- | 35 | -- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | -- | 76 | -- | ns |
| $t_f$ | Turn-Off Fall Time | | -- | 33 | -- | ns |
| $Q_g$ | Total Gate Charge | $V_{DS}$ = 480V, $I_D$ = 8A, $V_{GS}$ = 10V | -- | 17.5 | -- | nC |
| $Q_{gs}$ | Gate-Source Charge | | -- | 5 | -- | nC |
| $Q_{gd}$ | Gate-Drain Charge | | -- | 7 | -- | nC |
| **Drain-Source Diode Characteristics and Maximum Ratings** | | | | | | |
| $I_S$ | Maximum Continuous Drain-Source Diode Forward Current | | -- | -- | 8 | A |
| $I_{SM}$ | Maximum Pulsed Drain-Source Diode Forward Current | | -- | -- | 24 | A |
| $V_{SD}$ | Drain-Source Diode Forward Voltage | $V_{GS}$ = 0 V, $I_S$ = 5A | -- | -- | 1.4 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_F$ = 8A ,$V_{DD}$ = 100V, dI / dt = 100 A/us | -- | 260 | -- | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | -- | 2 | -- | µC |

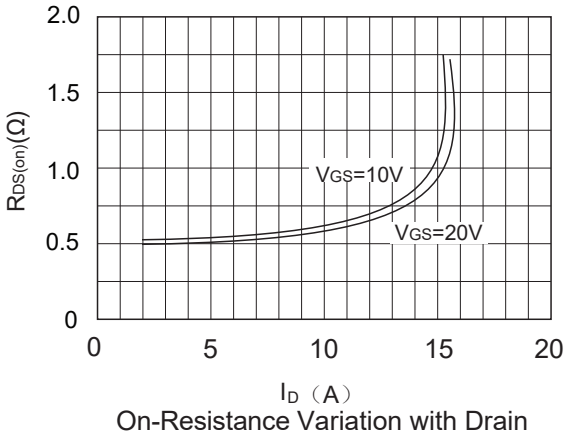
Note :

1.The EAS data shows Max. rating . The test condition is $V_{DD}$=80V,$V_{GS}$=10V,L=20mH,$I_{AS}$=3.4A.

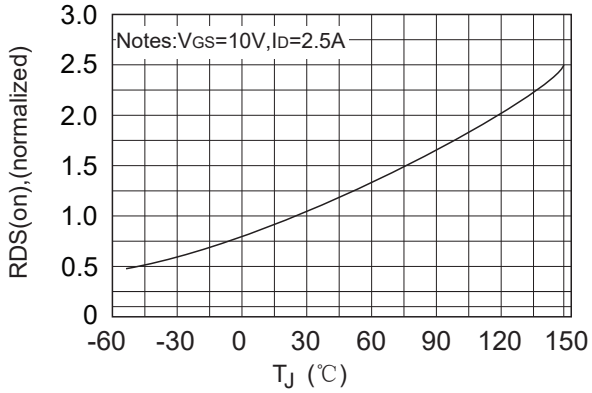
## Typical Characteristics



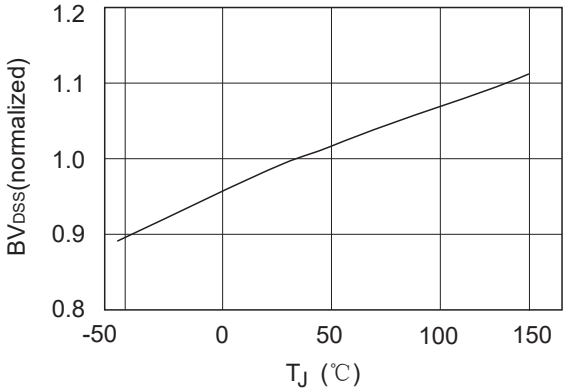

Output Characteristics



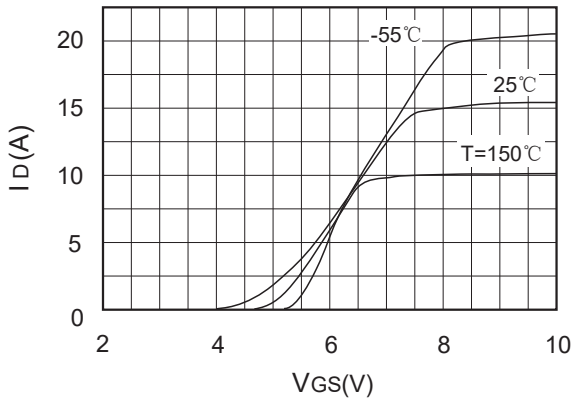

On-Resistance Variation with Drain Current and Gate Voltage



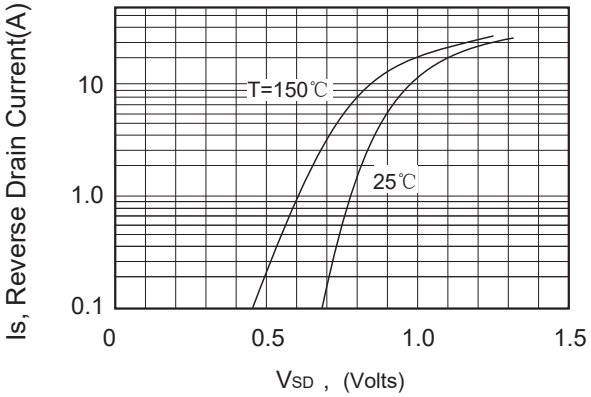

On-Resistance Variation with Temprature (Norrmalized)




Breakdown Voltage Variation vs.Temperature (Norrmalized)

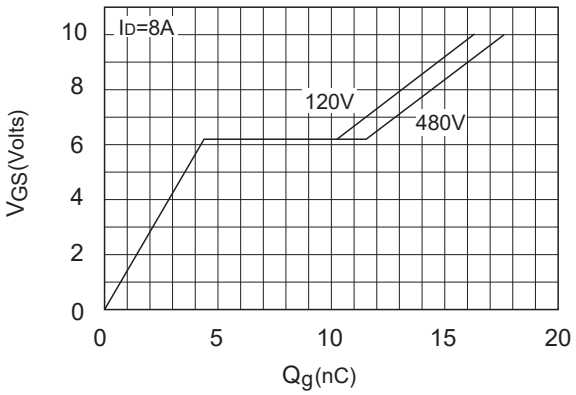



Transfer Characteristics

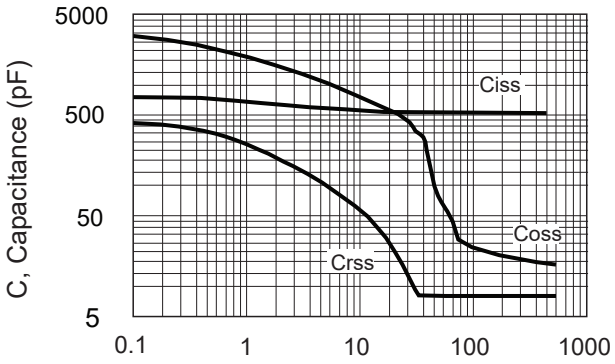



Body-Diode Characteristics

## Typical Characteristics

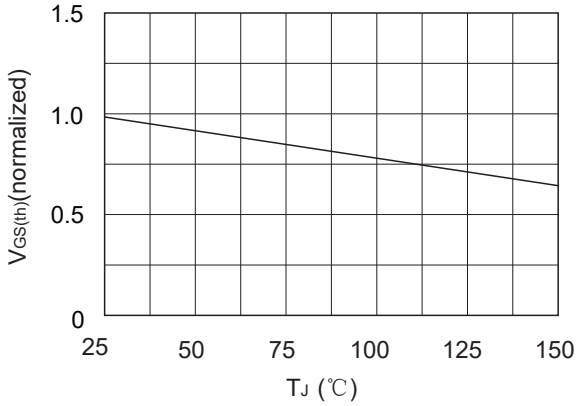



Gate-Charge Characteristics

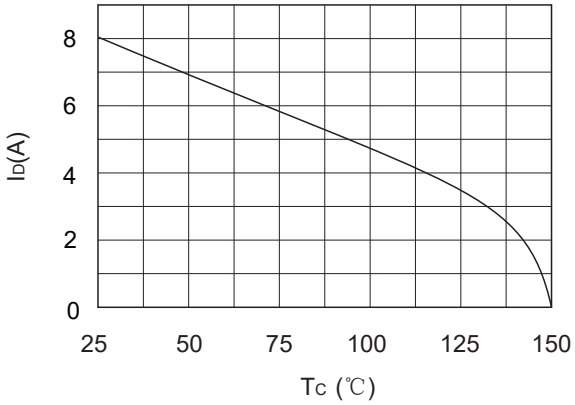



VDS , Drain-to-Source Voltage (V)

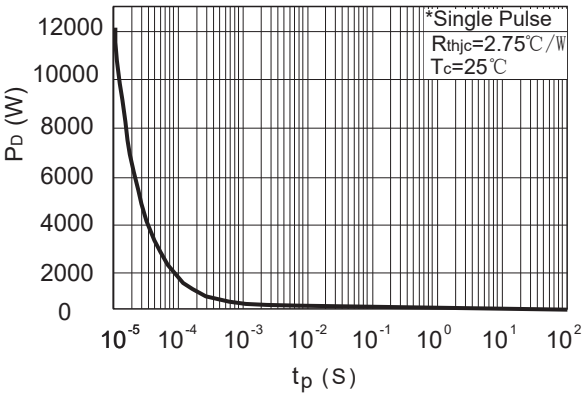
Capacitance Characteristics



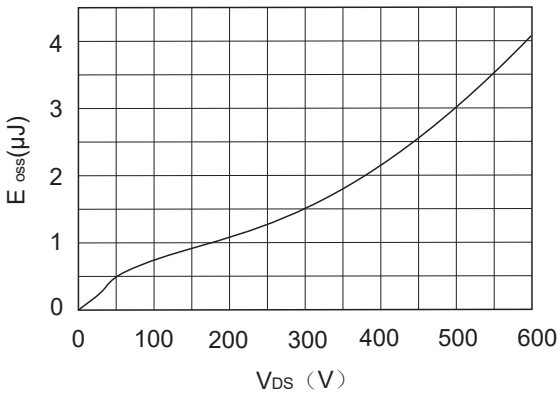

V(GS(th)) Variation with Temprature(Nomalized)




Maximum Drain Current vs Case Temperature

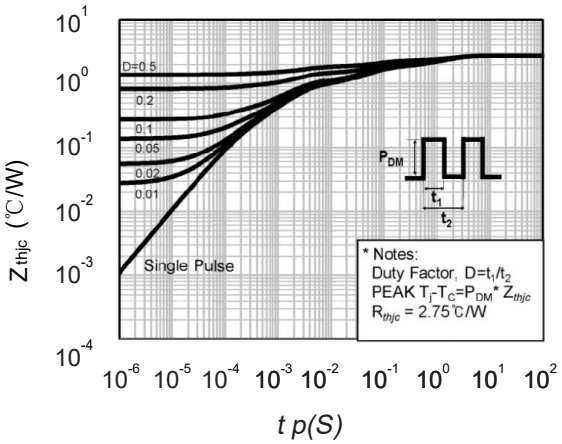



Single Pulse Maximum Power Dissipation

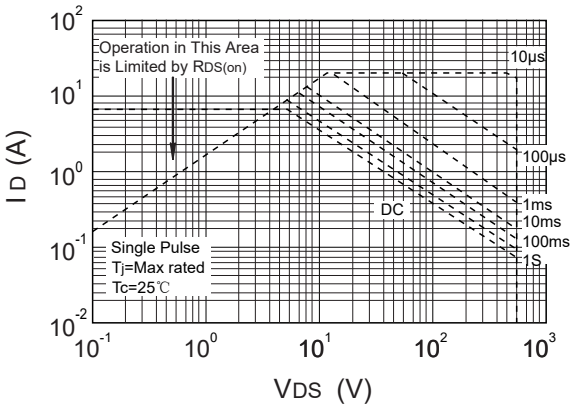



Output Capacitance Stored Energy

## Typical Characteristics

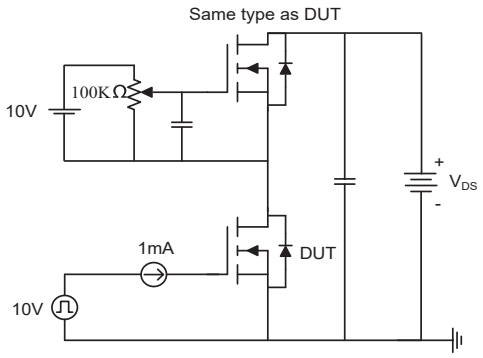



Transient Thermal Response Curve

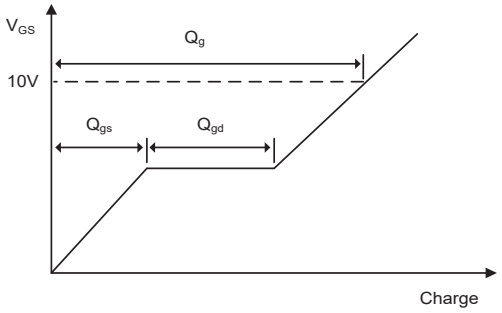



Maximum Safe Operating Area

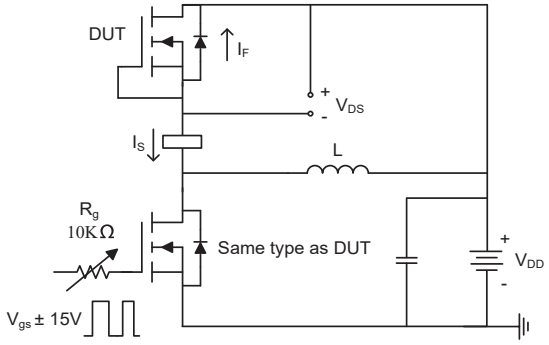
## Test Circuit



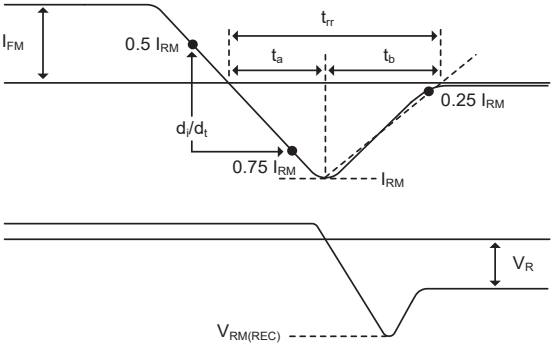

Gate charge measurement circuit



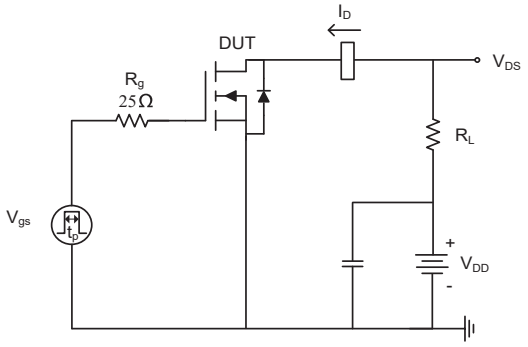

Gate charge waveform



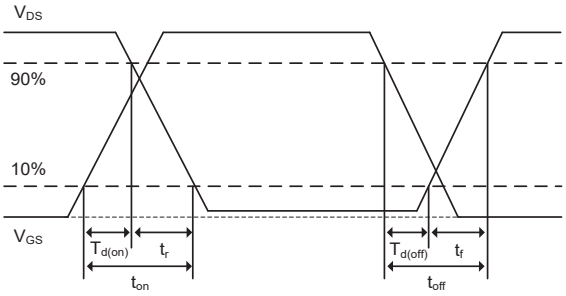

Diode reverse recovery test circuit



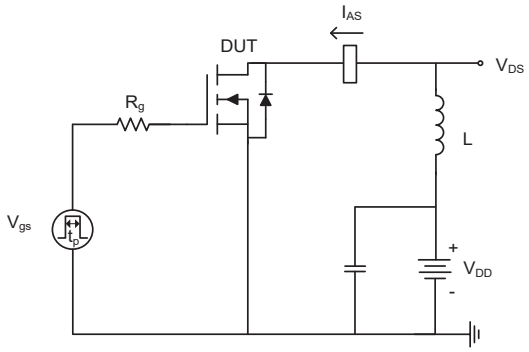

Diode reverse recovery test waveform



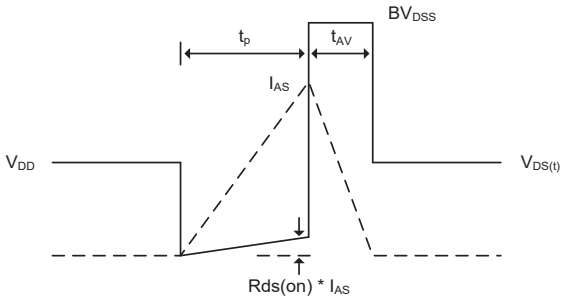

Switching time test circuit for resistive load




Switching time waveform




Unclamped inductive load test circuit




Unclamped inductive waveform