

# CMD65R580/CMU65R580

650V N-Channel Super Junction Power MOSFET

## General Description

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

## Features

- 8A, 650V, R<sub>DS(on)</sub> = 0.61Ω @V<sub>GS</sub> = 10 V
- 100% Avalanche Tested
- Improved dv/dt capability
- Extremely low switching loss

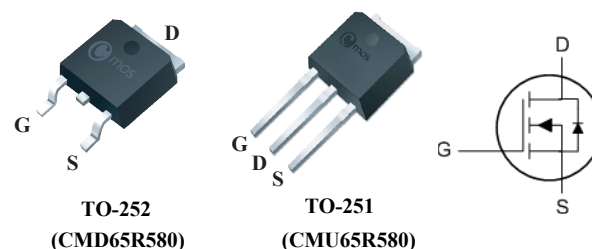
## Product Summary

BVDSS	R <sub>DS(ON)</sub>	ID
650V	0.62Ω	8A

## Applications

- Power Supply
- PFC
- Switching Applications

## TO-252/251 Pin Configuration



## Absolute Maximum Ratings

T<sub>C</sub> = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V <sub>DSS</sub>	Drain-Source Voltage	650	V
I <sub>D</sub>	Drain Current - Continuous (T <sub>C</sub> = 25°C)	8	A
	- Continuous (T <sub>C</sub> = 100°C)	5	A
I <sub>DM</sub>	Drain Current - Pulsed	24	A
V <sub>GSS</sub>	Gate-Source Voltage	±30	V
E <sub>AS</sub>	Single Pulse Avalanche Energy	170	mJ
P <sub>D</sub>	Power Dissipation (T <sub>C</sub> = 25°C)	45	W
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range	-55 to +150	°C

## Thermal Characteristics

Symbol	Parameter	Value	Units
R <sub>θC</sub>	Thermal Resistance, Junction-to-Case Max.	1.8	°C/W
R <sub>θA</sub>	Thermal Resistance, Junction-to-Ambient Max. (Steady State)	62.5	°C/W

### Electrical Characteristic

$T_C = 25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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#### Off Characteristics

$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	650	--	--	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$	--	--	1	$\mu\text{A}$
$I_{GSSF}$	Gate-Body Leakage Current, Forward	$V_{GS} = \pm 30\text{ V}, V_{DS} = 0\text{ V}$	--	--	$\pm 100$	nA

#### On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	2	--	4	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 2.5\text{ A}$	--	0.58	0.62	$\Omega$
$R_G$	Gate resistance	$f = 1\text{ MHz}, \text{ open drain}$	--	4	--	$\Omega$

#### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{ V}$	--	1000	--	pF
$C_{oss}$	Output Capacitance		$V_{GS} = 0\text{ V}$	--	430	--
$C_{rss}$	Reverse Transfer Capacitance	$f = 1.0\text{ MHz}$	--	25	--	pF

#### Switching Characteristics

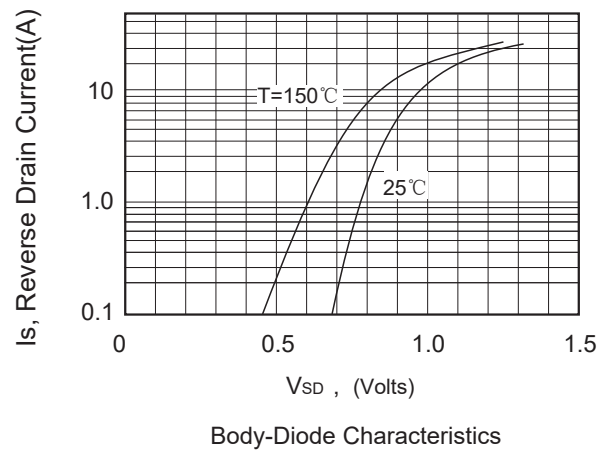
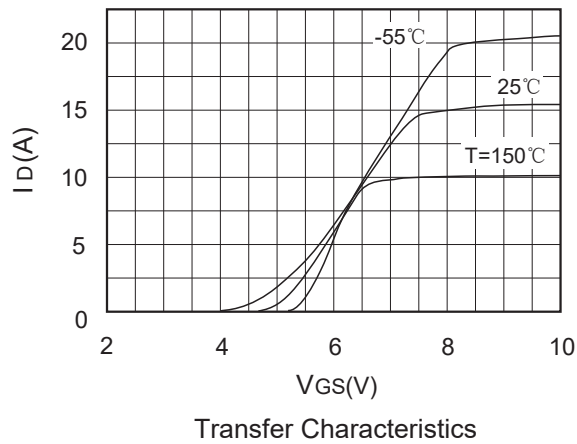
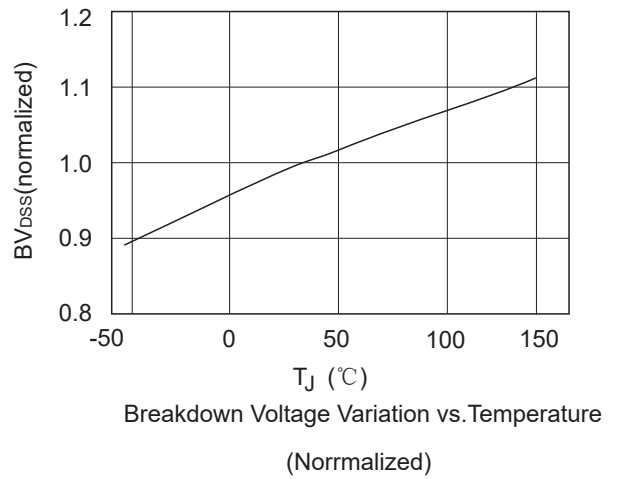
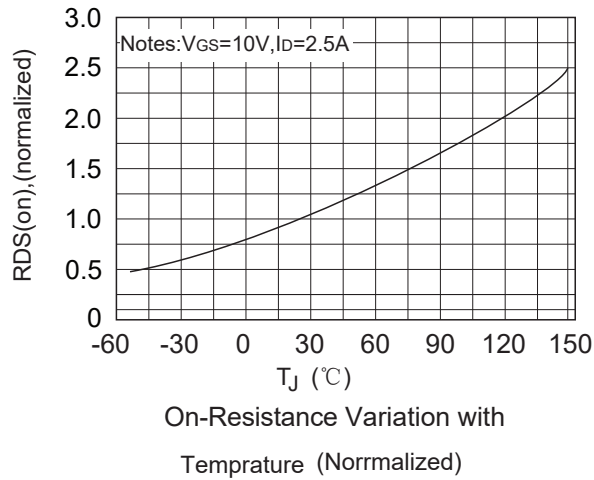
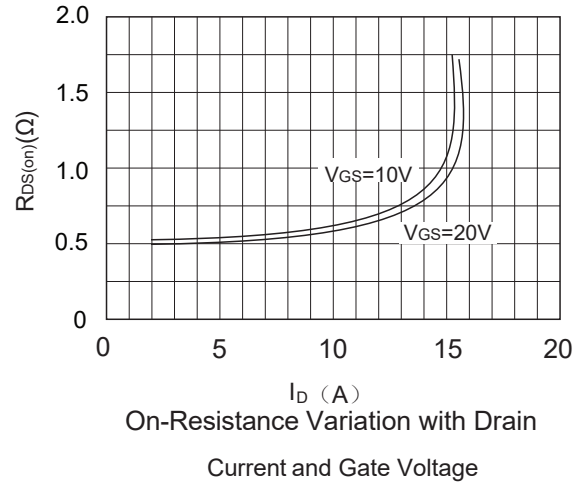
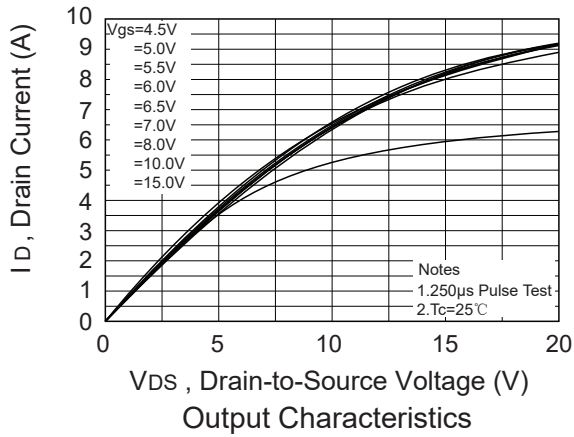
$t_{d(on)}$	Turn-On Delay Time	$V_{DS} = 300\text{ V}, V_{GS} = 10\text{ V}$ $I_D = 8\text{ A}$ $R_G = 25\ \Omega$	--	15	--	ns
$t_r$	Turn-On Rise Time		--	35	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	50	--	ns
$t_f$	Turn-Off Fall Time		--	25	--	ns
$Q_g$	Total Gate Charge	$V_{DS} = 480\text{ V}$ $I_D = 8\text{ A}$ $V_{GS} = 10\text{ V}$	--	20	--	nC
$Q_{gs}$	Gate-Source Charge		--	5	--	nC
$Q_{gd}$	Gate-Drain Charge		--	7	--	nC

#### Drain-Source Diode Characteristics and Maximum Ratings

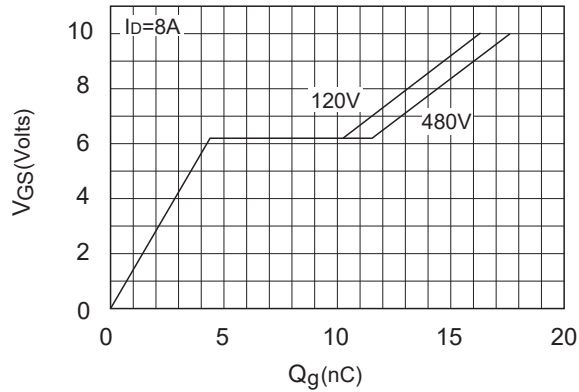
$I_S$	Maximum Continuous Drain-Source Diode Forward Current	--	--	8	A	
$I_{SM}$	Maximum Pulsed Drain-Source Diode Forward Current	--	--	24	A	
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 5\text{ A}$	--	--	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F = 8\text{ A}, V_{DD} = 100\text{ V}$ $dI/dt = 100\text{ A}/\mu\text{s}$	--	303	--	ns
$Q_{rr}$	Reverse Recovery Charge		--	2.4	--	$\mu\text{C}$

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Cmos assumes no liability for customers' product design or applications.  
Cmos reserves the right to improve product design, functions and reliability without notice.

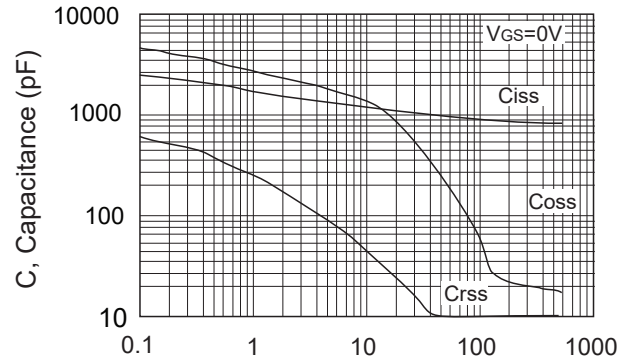
Typical Characteristics



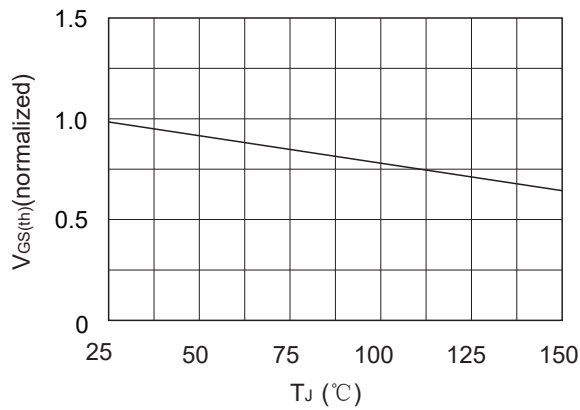
Typical Characteristics



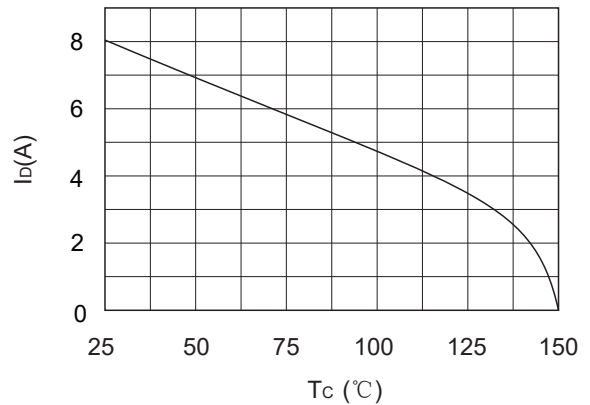
Gate-Charge Characteristics



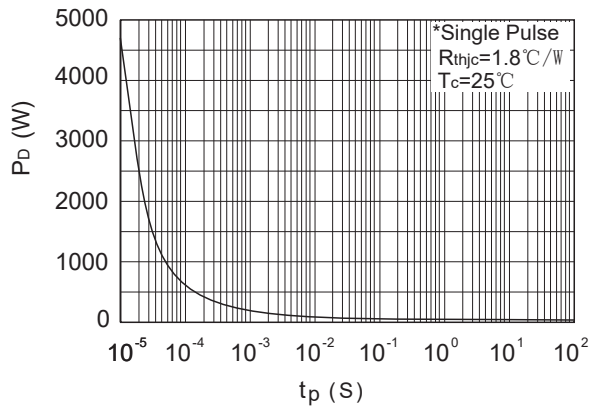
Capacitance Characteristics



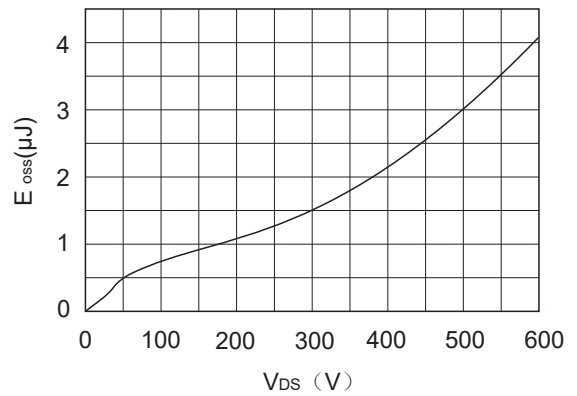
V<sub>GS(th)</sub> Variation with Temperature(Normalized)



Maximum Drain Current vs Case Temperature

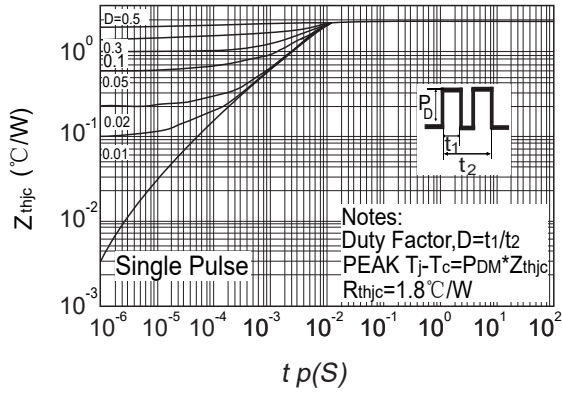


Single Pulse Maximum Power Dissipation

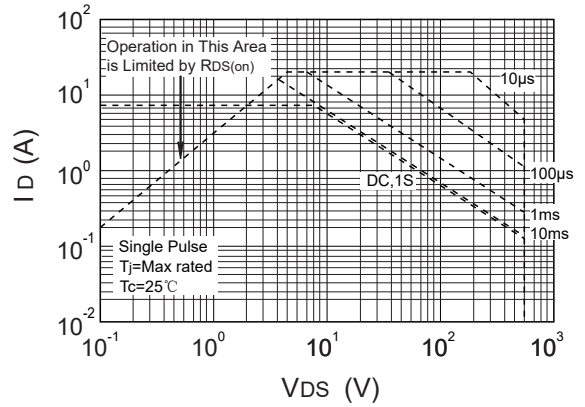


Output Capacitance Stored Energy

Typical Characteristics



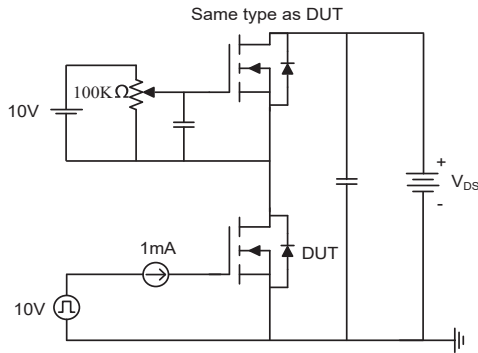
Transient Thermal Response Curve



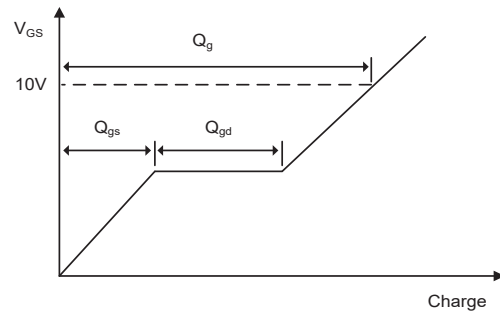
Maximum Safe Operating Area

## Test Circuit

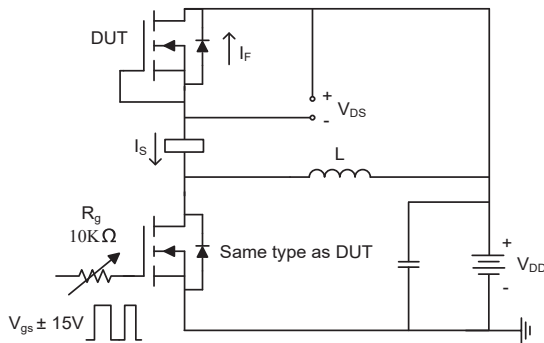
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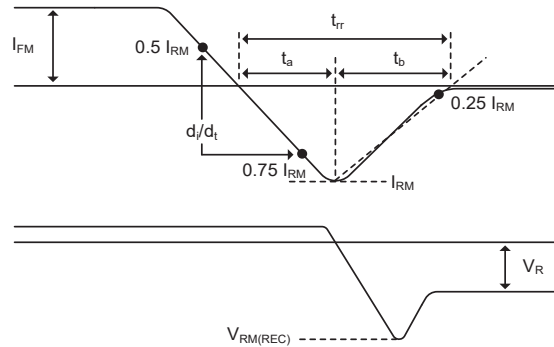
Gate charge measurement circuit



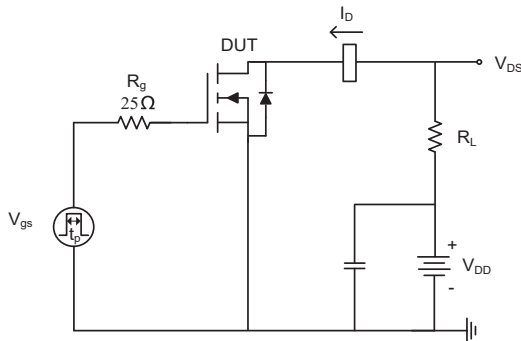
Gate charge waveform



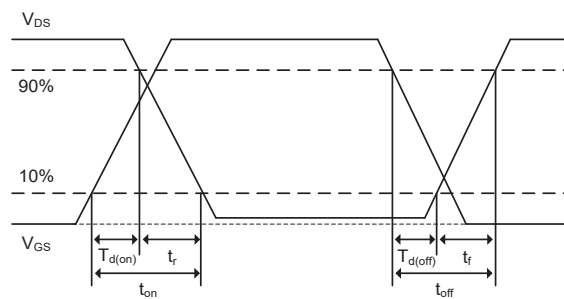
Diode reverse recovery test circuit



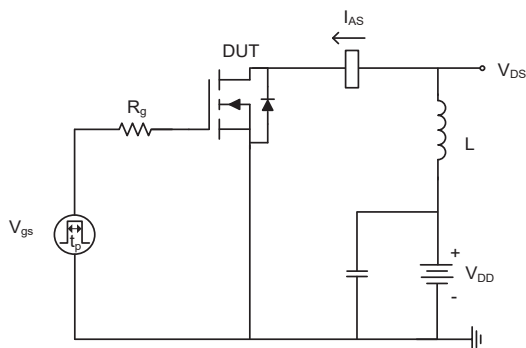
Diode reverse recovery test waveform



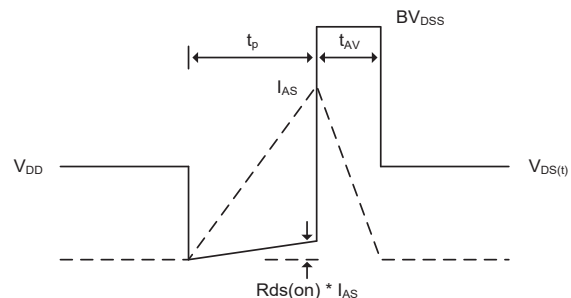
Switching time test circuit for resistive load



Switching time waveform



Unclamped inductive load test circuit



Unclamped inductive waveform