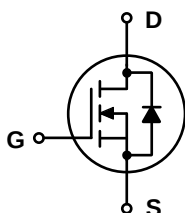


MCR65B280CTF

TO-220F



Features

- Reduced Switching & Conduction Losses
- Lower Gate Resistance
- 100% Avalanche Tested
- Pb- • free, Halogen Free, and RoHS Compliant

Application

- PFC, Hard & Soft Switching
- Topologies Industrial & Consumer Power Supplies

Absolute Maximum Ratings ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Unit
V_{DSS}	Drain to Source Voltage	650	V
V_{GSS}	Gate to Source Voltage	± 30	V
I_D	Drain Current	Continuous ($T_C = 25^\circ\text{C}$)	A
		Continuous ($T_C = 100^\circ\text{C}$)	
I_{DM}	Drain Current	Pulsed (Note1)	A
E_{AS}	Single Pulsed Avalanche Energy	(Note2)	mJ
I_{AS}	Avalanche Current	(Note2)	A
E_{AR}	Repetitive Avalanche Energy	(Note1)	mJ
dv/dt	MOSFET dv/dt	100	V/ns
	Peak Diode Recovery dv/dt	(Note3)	
P_D	Power Dissipation	($T_C = 25^\circ\text{C}$)	W
		Derate Above 25°C	$\text{W}/^\circ\text{C}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_L	Maximum Lead Temperature for Soldering, 1/8" from Case for 10 Seconds	260	$^\circ\text{C}$

*Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	4.1	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	

Package Marking and Ordering Information

Part Number	Top Marking	Package	Packing Method	Quantity
MCR65B280CTF	MCR65B280CTF	TO-220F	Tube	50 units

Electrical Characteristics ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
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Off Characteristics

BV_{DSS}	Drain to Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	650			V
		$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}, T_J = 150^\circ\text{C}$	650			
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 600\text{ V}, V_{GS} = 0\text{ V}$			1	μA
		$V_{DS} = 480\text{ V}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$		2		
I_{GSS}	Gate-Source Leakage Current	$V_{GS} = \pm 30\text{ V}, V_{DS} = 0\text{ V}$			± 100	nA

On Characteristics

$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 1.1\text{ mA}$	2.5		4.5	V
$R_{DS(on)}$	Static Drain to Source On Resistance	$V_{GS} = 10\text{ V}, I_D = 5.3\text{ A}$		238	280	m Ω

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 400\text{ V}, V_{GS} = 0\text{ V},$ $f = 250\text{ kHz}$		780		pF
C_{oss}	Output Capacitance			23		pF
$C_{o(tr)}$	Time Related Output Capacitance	$V_{DS} = 0\text{ V to } 400\text{ V}, V_{GS} = 0\text{ V}$		300		pF
$C_{o(er)}$	Energy Related Output Capacitance			37		pF
$Q_{g(tot)}$	Total Gate Charge at 10 V	$V_{DS} = 400\text{ V}, I_D = 5.3\text{ A},$ $V_{GS} = 10\text{ V}$		19.6		nC
Q_{gs}	Gate to Source Charge			3.7		nC
Q_{gd}	Gate to Drain "Miller" Charge			9.7		nC
R_G	Gate Resistance	$f = 1\text{ MHz}$		1.1		Ω

Switching Characteristics

$t_{d(on)}$	Turn-On Delay Time	$V_{DS} = 400\text{ V}, I_D = 5.3\text{ A},$ $V_{GS} = 10\text{ V}, R_G = 10\text{ }\Omega$ See Figure 13		7.6		ns
t_r	Turn-On Rise Time			6.7		ns
$t_{d(off)}$	Turn-Off Delay Time			38.2		ns
t_f	Turn-Off Fall Time			8.4		ns

Source-Drain Diode Characteristics

I_S	Maximum Continuous Diode Forward Current			15	A
I_{SM}	Maximum Pulsed Diode Forward Current			37.5	A
V_{SD}	Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_{SD} = 5.3\text{ A}$		1.2	V
t_{rr}	Reverse Recovery Time	$V_{DD} = 400\text{ V}, I_{SD} = 5.3\text{ A},$ $di_F/dt = 100\text{ A}/\mu\text{s}$		234	ns
Q_{rr}	Reverse Recovery Charge			2.2	μC

※Notes:

1. Repetitive rating: pulse-width limited by maximum junction temperature.
2. $I_{AS} = 3\text{ A}, R_G = 25\text{ }\Omega$, starting $T_J = 25^\circ\text{C}$.
3. $I_{SD} \leq 5.3\text{ A}, di/dt \leq 100\text{ A}/\mu\text{s}, V_{DD} \leq 400\text{ V}$, starting $T_J = 25^\circ\text{C}$.

Typical Performance Characteristics

Figure 1. On-Region Characteristics

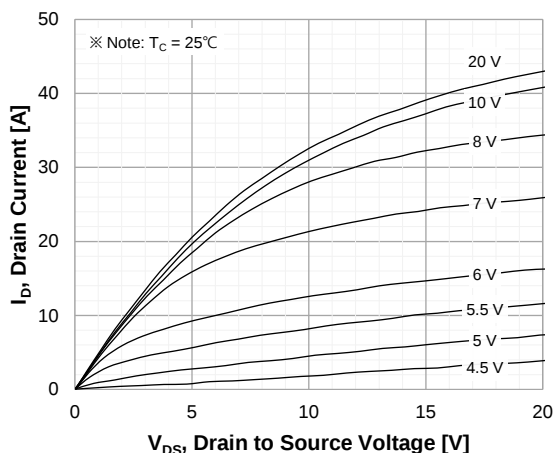


Figure 2. Transfer Characteristics

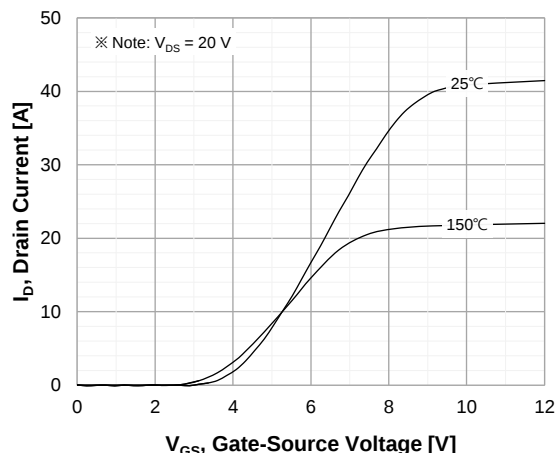


Figure 3. On-Resistance Characteristics vs. Drain Current and Gate Voltage

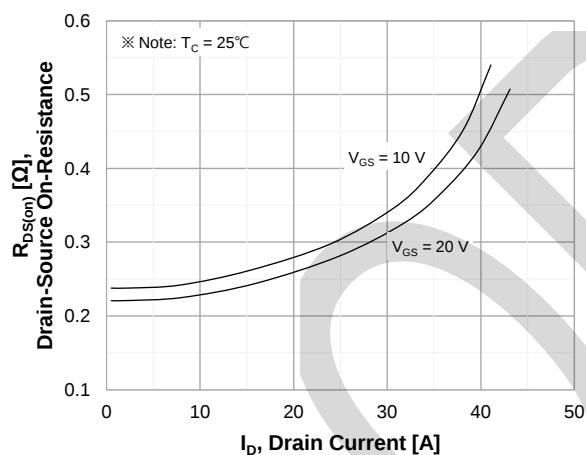


Figure 4. Diode Forward Voltage Characteristics vs. Source-Drain Current and Temperature

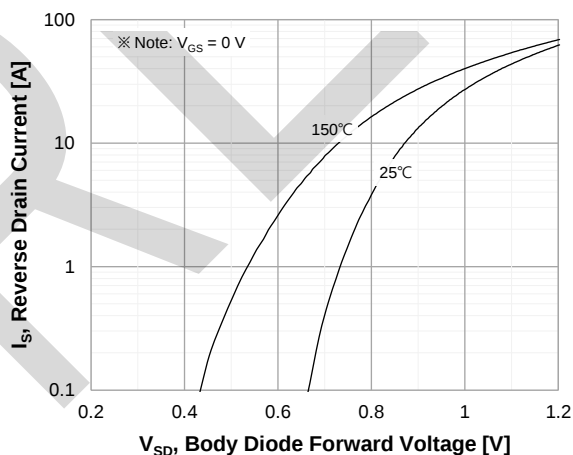


Figure 5. Capacitance Characteristics

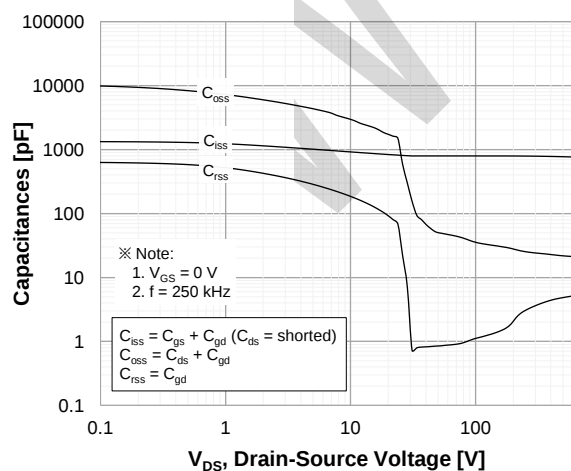
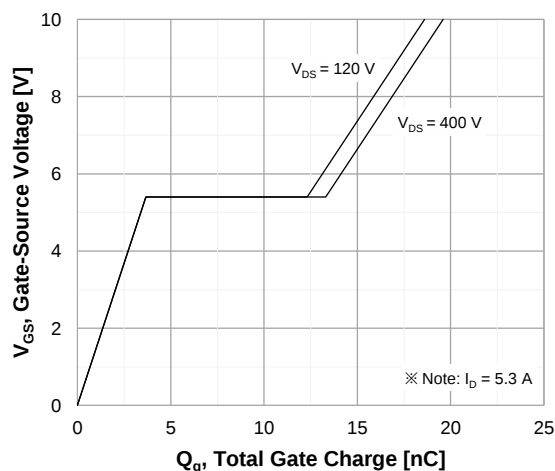


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics

Figure 7. Breakdown Voltage Characteristics vs. Temperature

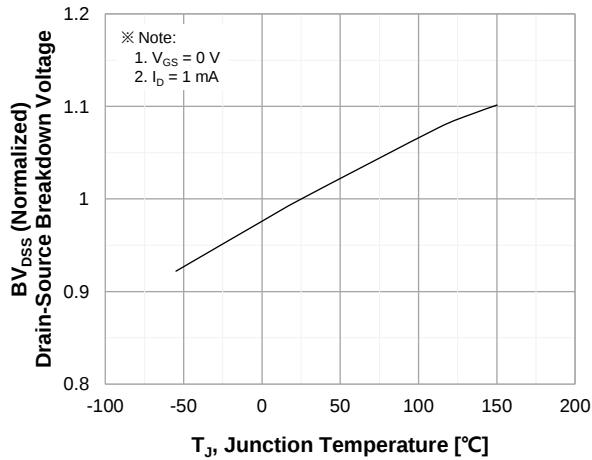


Figure 8. On-Resistance Characteristics vs. Temperature

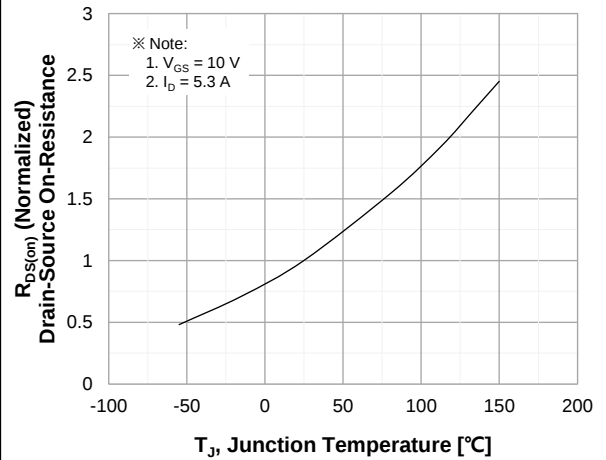


Figure 9. Maximum Safe Operating Area

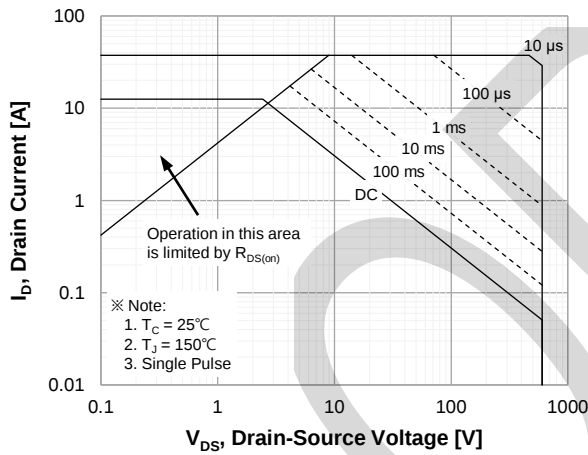


Figure 10. Maximum Drain Current vs. Case Temperature

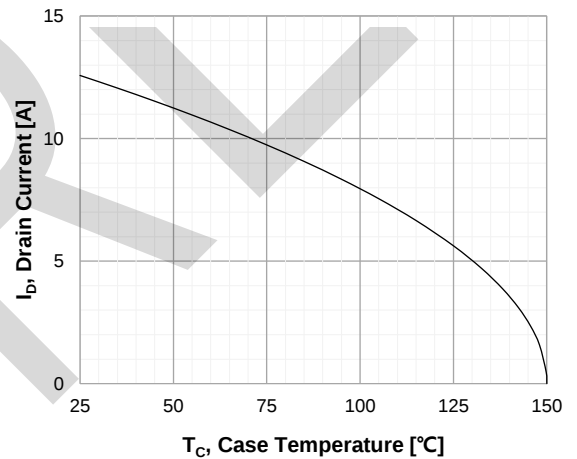


Figure 11. E_{oss} vs. Drain to Source Voltage

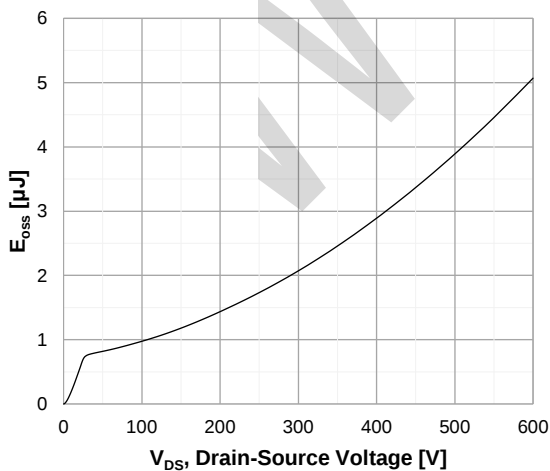
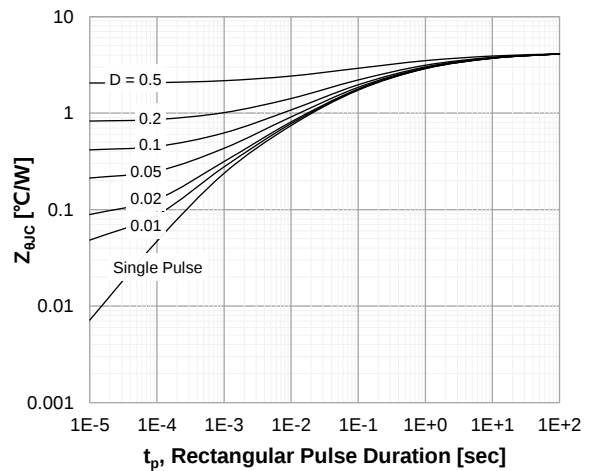
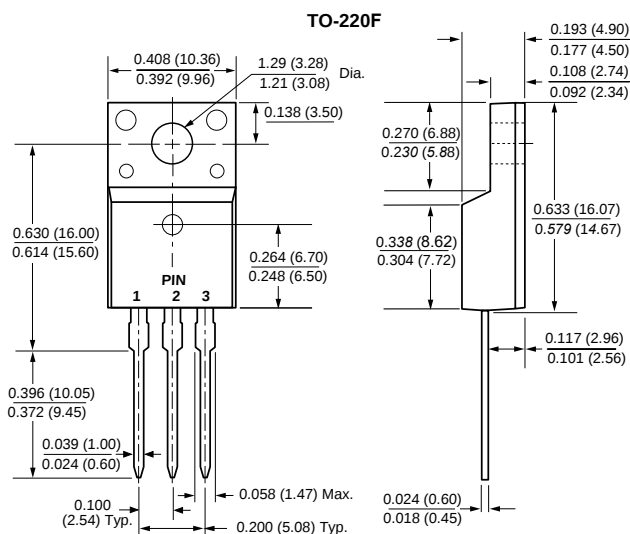


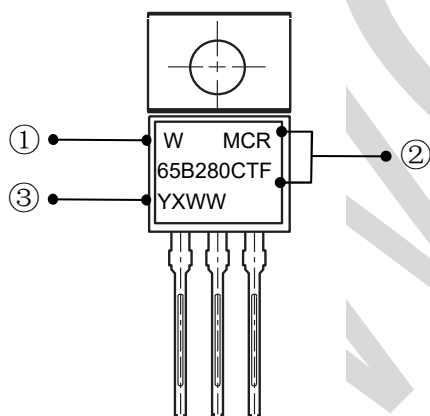
Figure 12. Transient Thermal Response Curve



PACKAGE OUTLINE DIMENSIONS



Marking Information



- ①W : Company's trademark
- ②Product model : MCR65B280CTF
- ③PDC information :

Y X WW

WW:Week code(01 to 53)

X:Internal identification code

Y:Year code(ex:0=2020)