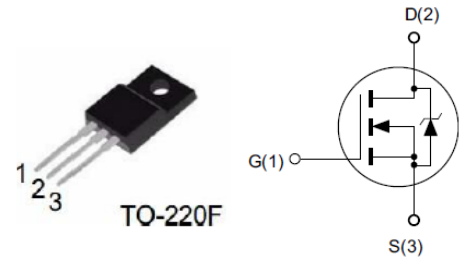


Features

- ◆ 500V, 20A, $R_{DS(on)}(Typ.) = 0.24\Omega @ V_{GS} = 10V$
- ◆ Fast Switching
- ◆ 100% Avalanche Tested

Application

- ◆ PFC
- ◆ Adapter
- ◆ Standby Power
- ◆ DC-AC Power Converter



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

Symbol	Parameter		Rating	Unit
V_{DS}	Drain-Source Voltage ^a		500	V
V_{GS}	Gate-Source Voltage		± 30	
I_D	Drain Current-Continuous	$T_c = 25^\circ\text{C}$	20	A
		$T_c = 100^\circ\text{C}$	12.5	
I_{DM}	Drain Current-Pulsed ^b		80	
P_D	Maximum Power Dissipation, $T_J = 25^\circ\text{C}$		88	W
E_{AS}	Single Pulsed Avalanche Energy ^c		980	mJ
T_J, T_{STG}	Operating and Store Temperature Range		150, -55 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.42	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62.5	

Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

■ Off Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	500	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 500V, V_{GS} = 0V$	-	-	1.0	μA
I_{GSS}	Forward Gate Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 30V$	-	-	± 100	nA



MPF20N50

N-Channel Power MOSFET

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	-	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance ^d	$V_{GS} = 10V, I_D = 10A$	-	0.24	0.30	Ω

■ Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	$V_{DS} = 25V,$ $V_{GS} = 0V,$ $f = 1.0MHz$	-	3059	-	pF
C_{oss}	Output Capacitance		-	291	-	
C_{rss}	Reverse Transfer Capacitance		-	16	-	

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 250V,$ $V_{GS} = 10V,$ $I_D = 20A$	-	35	-	ns
t_r	Turn-On Rise Time		-	64	-	
$t_{d(off)}$	Turn-Off Delay Time		-	83	-	
t_f	Turn-Off Fall Time		-	44	-	
Q_g	Total Gate Charge	$V_{DD} = 400V,$ $V_{GS} = 0 \text{ to } 10V,$ $I_D = 20A$	-	54	-	nC
Q_{gs}	Gate-Source Charge		-	13.3	-	
Q_{gd}	Gate-Drain Charge		-	18.7	-	

■ Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_S	Drain-Source Diode Forward Continuous Current	$V_G = V_D = 0V,$ Force Current	-	-	20	A
I_{SM}	Maximum Pulsed Current		-	-	80	
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_S = 20A$	-	-	1.4	V
T_{rr}	Body Diode Reverse Recovery Time	$V_{GS} = 0V, I_S = 20A$ $di_F/dt = 100A/\mu s$	-	535	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge		-	6.4	-	μC

Notes:

- $T_J = +25^\circ C$ to $+150^\circ C$.
- Repetitive rating; pulse width limited by maximum junction temperature.
- Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.
- $L = 10mH, V_{DD} = 50V, I_{AS} = 14A, R_G = 25\Omega$ Starting $T_J = 25^\circ C$.

Characteristic Curve

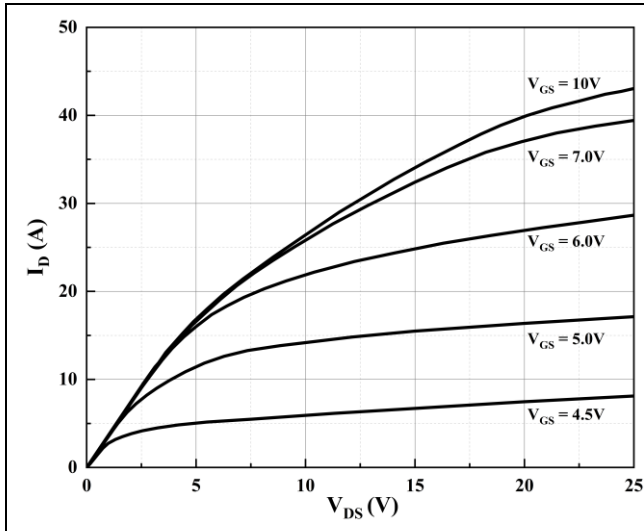


Figure 1. Typical Output Characteristics

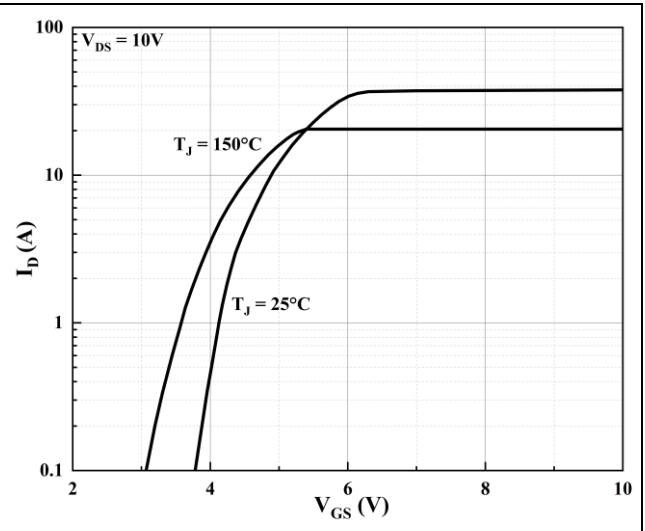


Figure 2. Typical Transfer Characteristics

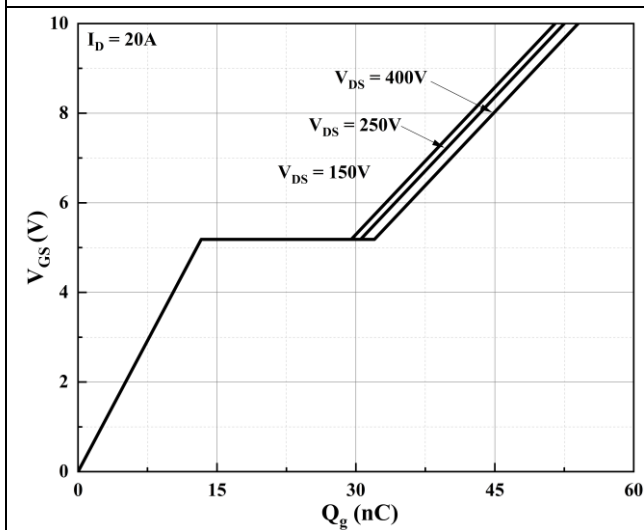


Figure 3. Typical Gate Charge

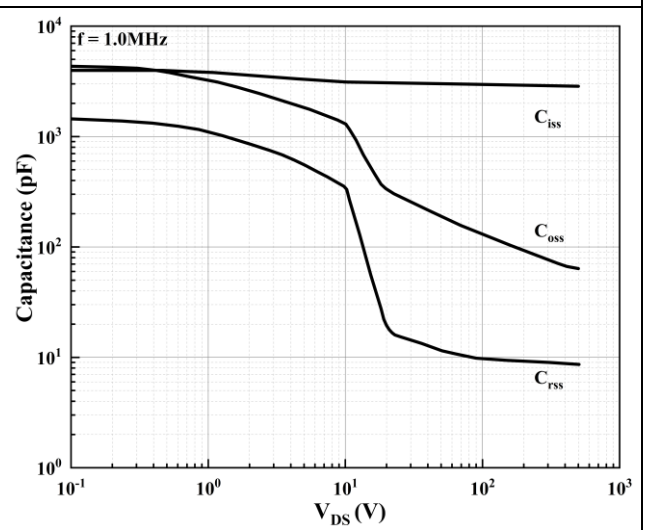


Figure 4. Typical Capacitance

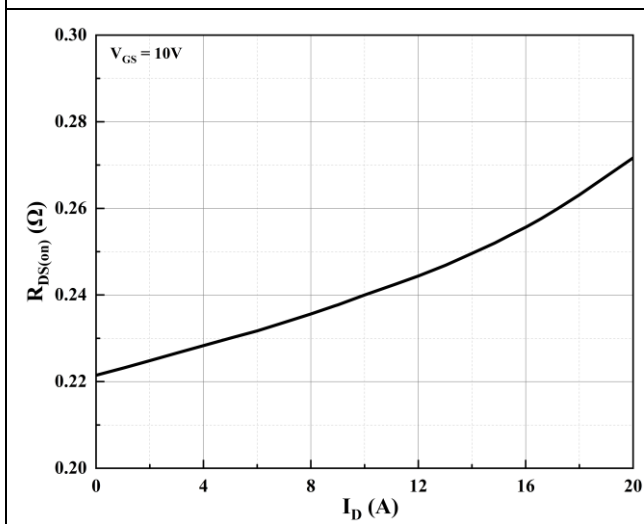


Figure 5. Static Drain-Source On-Resistance vs. Drain Current

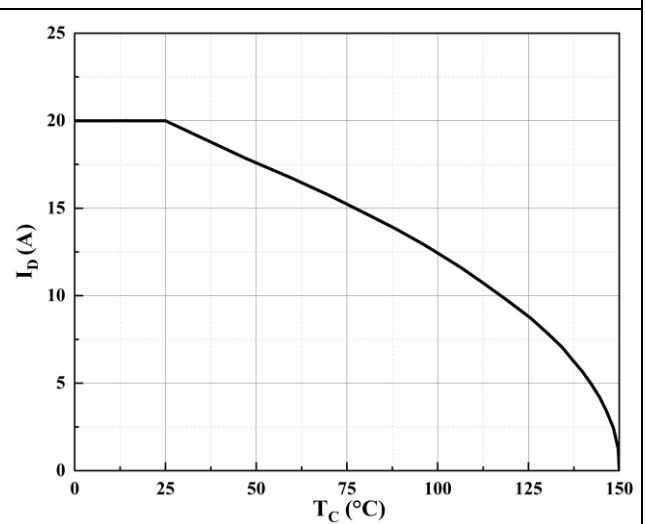


Figure 6. Maximum Continuous Drain Current vs. Case Temperature

Characteristic Curve

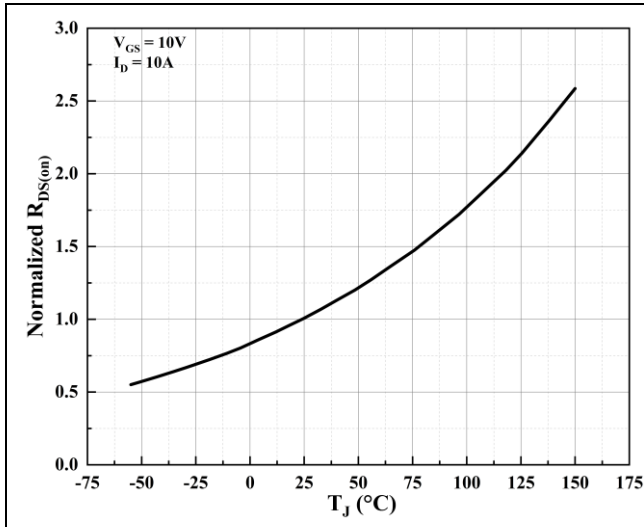


Figure 7. Normalized Static Drain-Source On-Resistance vs. Junction Temperature

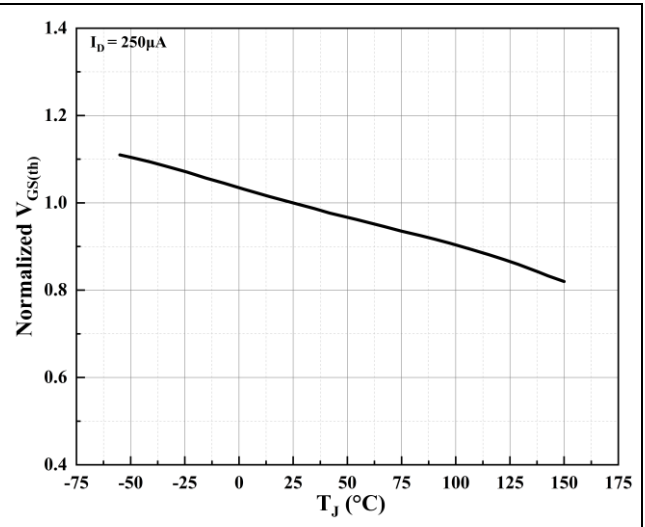


Figure 8. Normalized Threshold Voltage vs. Junction Temperature

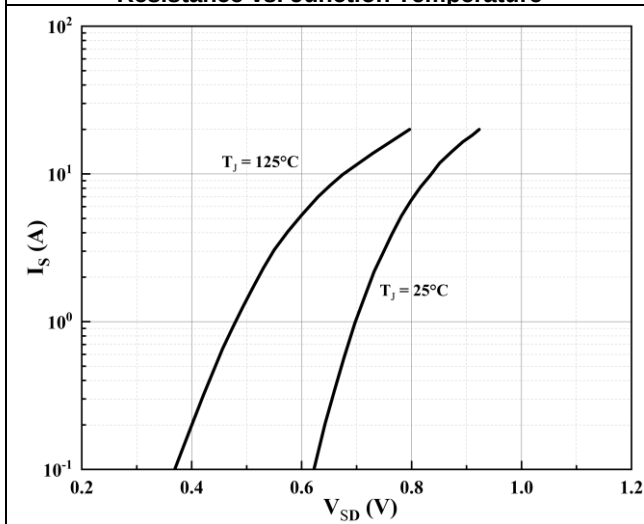


Figure 9. Body Diode Characteristics

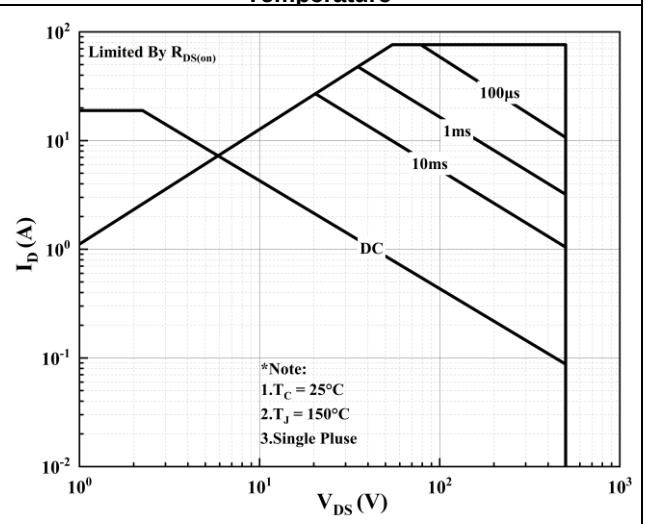


Figure 10. Safe Operating Area

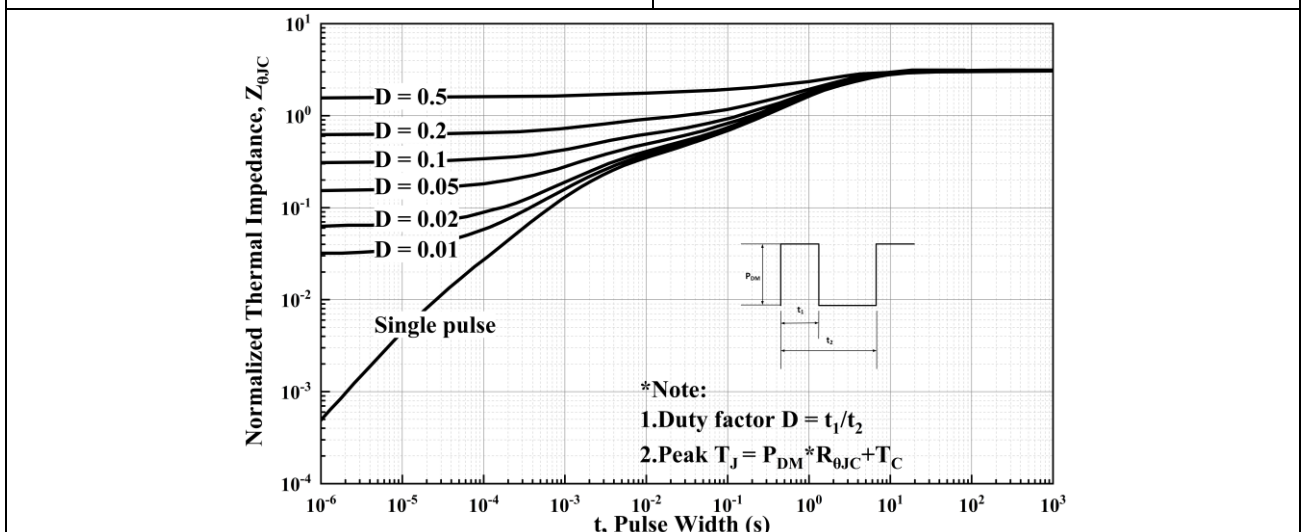


Figure 11. Normalized Maximum Transient Thermal Impedance

■ Package Information

