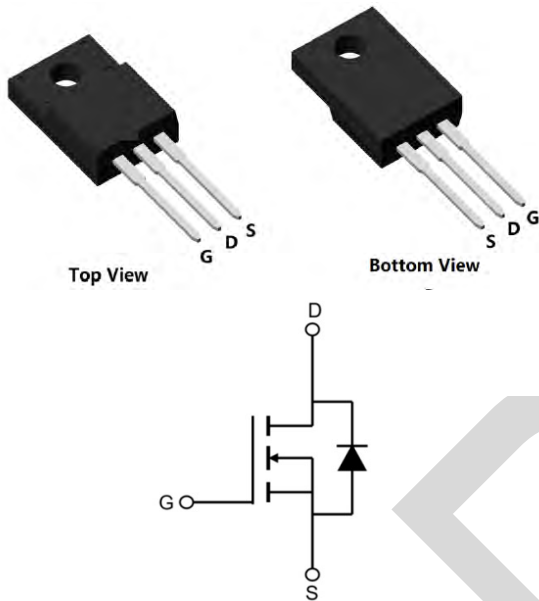


500V N-Channel Power MOSFET

**MPR13N50CTF
TO-220F**



V_{DS}	500	V
$R_{DS(on),TYP@ V_{GS}=10V}$	0.30	Ω
I_D	13	A

Features

- Low gate charge
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

Applications

- Load Switch for Portable Devices
- DC/DC Converter

Maximum ratings, at $T_A = 25^\circ\text{C}$, unless otherwise specified

Symbol	Parameter	Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage	500	V
V_{GS}	Gate-Source voltage	± 30	V
I_S	Diode continuous forward current	$T_C = 25^\circ\text{C}$ 13	A
I_D	Continuous drain current @ $V_{GS}=10V$	$T_C = 25^\circ\text{C}$ 13	A
		$T_C = 100^\circ\text{C}$ 8.5	A
I_{DM}	Pulse drain current tested ①	$T_C = 25^\circ\text{C}$ 52	A
E_{AS}	Avalanche energy, single pulsed ②	304	mJ
P_D	Maximum power dissipation	$T_C = 25^\circ\text{C}$ 50	W
T_{STG}, T_J	Storage and Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	Typical	Unit
R _{θJC}	Thermal Resistance, Junction-to-Case	2.50	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	62.5	°C/W

Electrical Characteristics

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
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Static Electrical Characteristics @ T_j=25°C (unless otherwise stated)

V(BR)DSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	500	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =500V, V _{GS} =0V	--	--	1	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±30V, V _{DS} =0V	--	--	±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	2.0	--	4.0	V
R _{DS(on)}	Drain-Source On-State Resistance ④	V _{GS} =10V, I _D =6.5A	--	0.30	0.38	Ω

Dynamic Electrical Characteristics @ T_j = 25°C (unless otherwise stated)

C _{iss}	Input Capacitance	V _{DS} =25V, V _{GS} =0V, f=1MHz	--	2411	--	pF
C _{oss}	Output Capacitance		--	125	--	pF
C _{rss}	Reverse Transfer Capacitance		--	15	--	pF
Q _g (10V)	Total Gate Charge	V _{DS} =400V, I _D =13A , V _{GS} =10V	--	40	--	nC
Q _{gs}	Gate-Source Charge		--	9.0	--	nC
Q _{gd}	Gate-Drain Charge		--	18	--	nC

Switching Characteristics

Td(on)	Turn-on Delay Time	V _{DD} =250V, I _D =13A, R _G =25Ω, T _J =25°C	--	39	--	ns
Tr	Turn-on Rise Time		--	70	--	ns
Td(off)	Turn-Off Delay Time		--	122	--	ns
Tf	Turn-Off Fall Time		--	72	--	ns

Source- Drain Diode Characteristics@ T_J = 25°C (unless otherwise stated)

I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current	--	--	52	A
VSD	Forward on voltage	I _{SD} =13A, V _{GS} =0V	--	--	1.4 V
Trr	Reverse Recovery Time	I _S =13A , V _{GS} =0V	--	311	ns
Qrr	Reverse Recovery Charge	di/dt=100A/μs	--	5.2	nC

NOTE: ① Repetitive rating; pulse width limited by max junction temperature.

② Limited by T_{Jmax}, starting T_J = 25°C, L = 10mH, I_{AS} = 7.8A, V_{GS} = 10V. Part not recommended for use above this value

③ The power dissipation P_{DSM} is based on R_{θJA} and the maximum allowed junction temperature of 150°C.

④ Pulse width ≤ 300μs; duty cycle ≤ 1%.

Typical Characteristics

Figure1: Output Characteristics

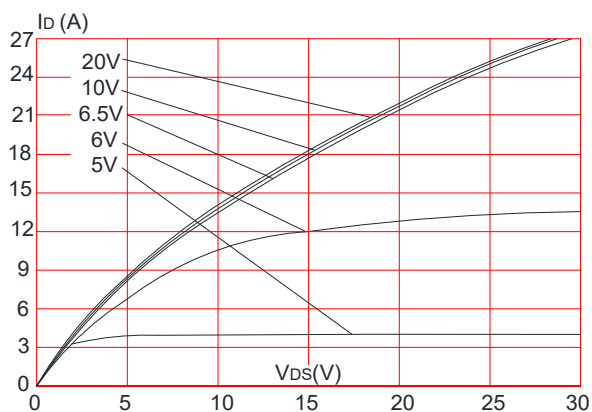


Figure 2: Typical Transfer Characteristics

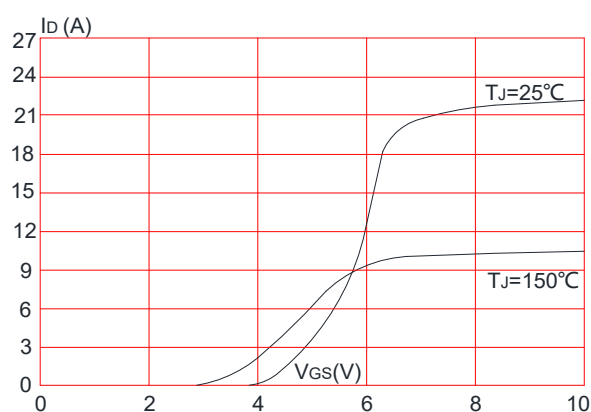


Figure 3: On-resistance vs. Drain Current

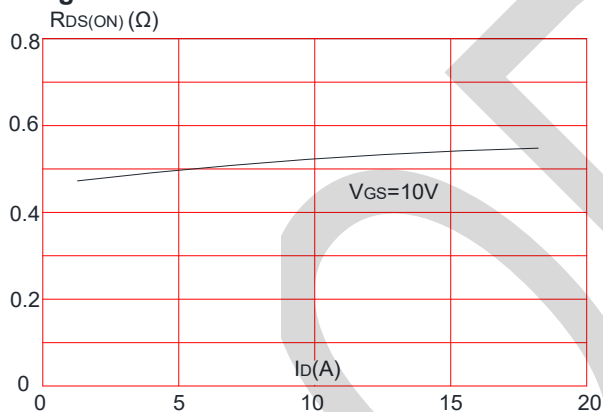


Figure 4: Body Diode Characteristics

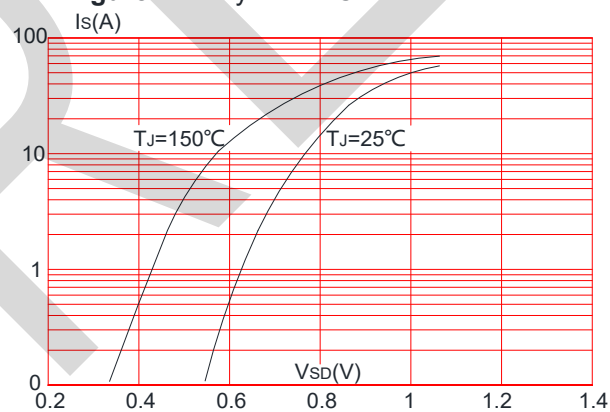


Figure 5: Gate Charge Characteristics

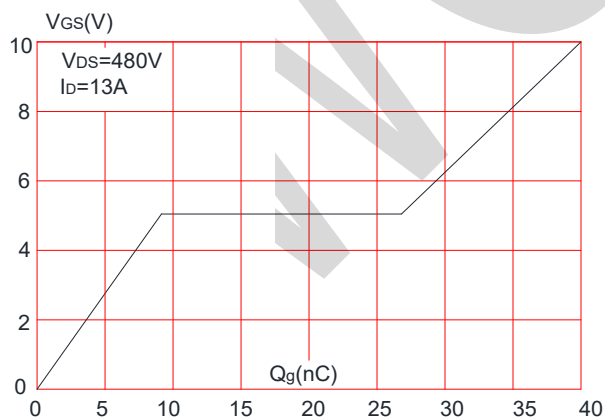
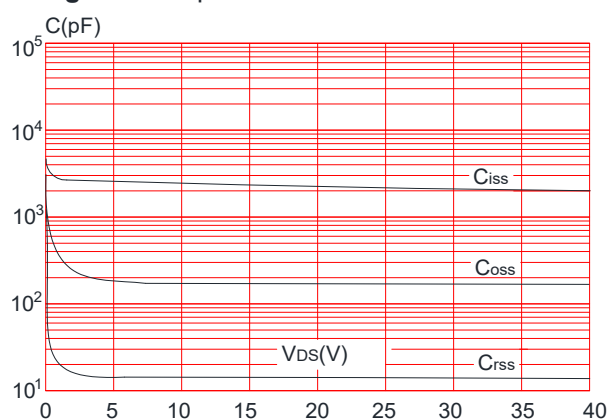


Figure 6: Capacitance Characteristics



Typical Characteristics

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

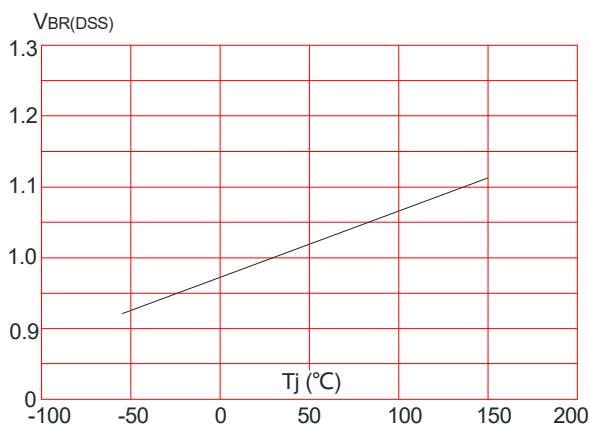


Figure 8: Normalized on Resistance vs. Junction Temperature

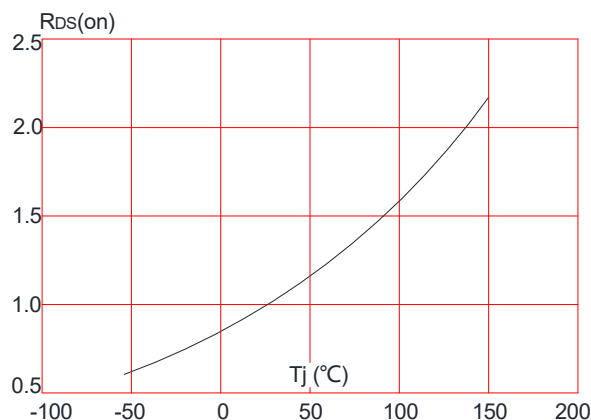


Figure 9: Maximum Safe Operating Area

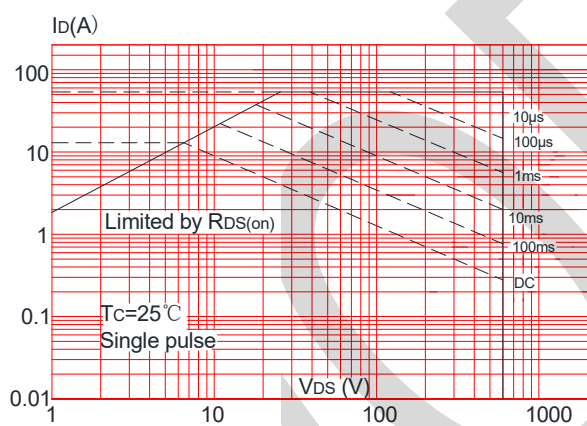


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

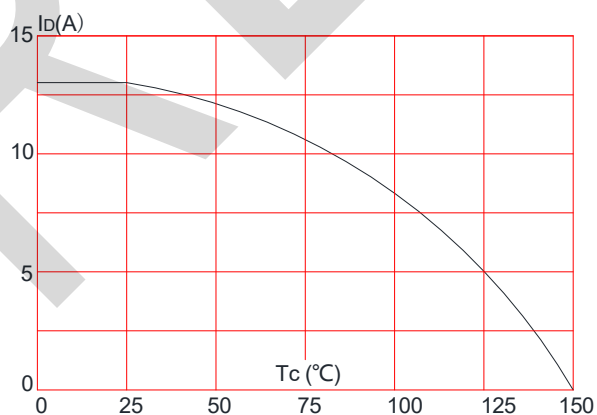
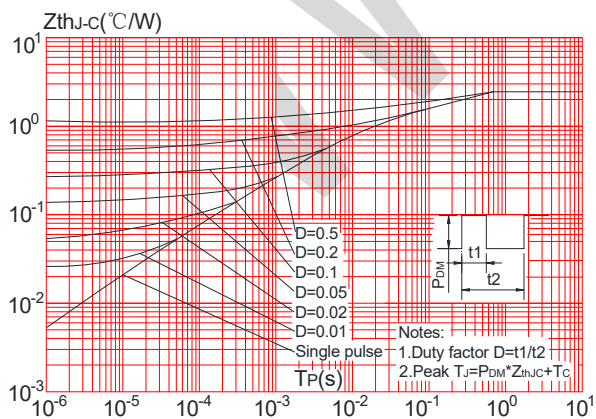
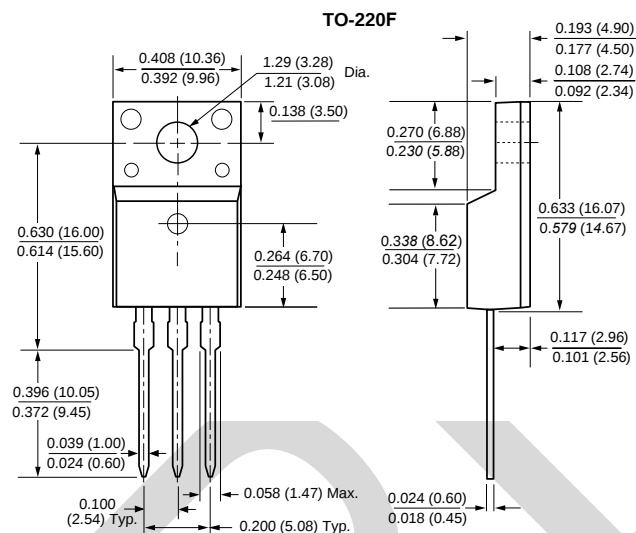


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

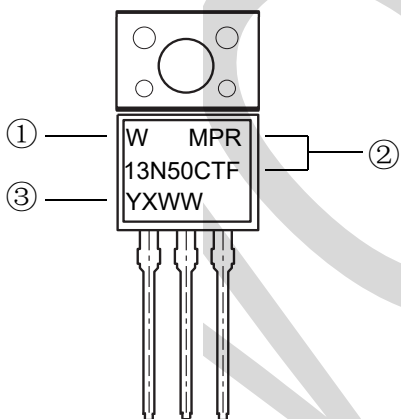


PACKAGE OUTLINE DIMENSIONS

TO-220F Package Information



Marking Information



- ① W : Company's trademark
- ② Product model : MPR13N50CTF
- ③ PDC information:

Y X WW

WW: Week code(01 to 53)

X: Internal identification code

Y: Year code(ex:0=2020)