

N-Channel MOSFET

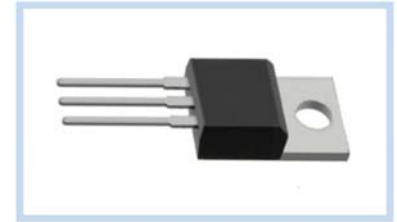
200V 45A 178W TO-220

MFT20N45T220

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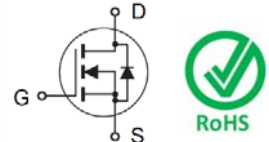
FEATURE

- $R_{DS} < 36m\Omega$, $V_{GS}=10V$, $I_D=10A$
- Fast Switching
- Low Gate Charge



MECHANICAL DATA

- Case: TO-220 Package
- Terminal: Solderable per MIL-STD-750, Method 2026

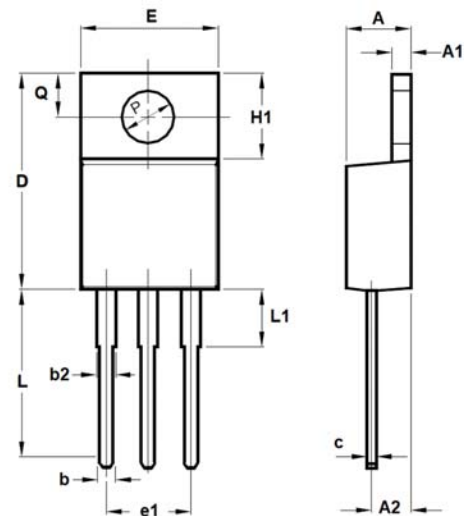


MAXIMUM RATINGS

Parameter	Symbol	Value	Unit	
Drain-Source Voltage	V_{DS}	200	V	
Gate-Source Voltage	V_{GS}	± 20	V	
Drain Current – Continuous	I_D	$T_C=25^\circ C$	45	A
		$T_C=100^\circ C$	28	A
		$T_A=25^\circ C$	9	A
		$T_A=70^\circ C$	7.2	A
Drain Current – Pulsed	I_{DM}	135	A	
Body Diode Forward Current	I_S	45	A	
Avalanche Current	I_{AS}	12	A	
Avalanche Energy	E_{AS}	25	mJ	
Power Dissipation	P_D	$T_C=25^\circ C$	178	W
		$T_C=100^\circ C$	71	W
		$T_A=25^\circ C$	7.3	W
		$T_A=70^\circ C$	4.7	W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	17	$^\circ C/W$	
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.17	$^\circ C/W$	
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ C$	

DIMENSIONS

Item	Min. (mm)	Max. (mm)
A	4.320	4.826
A1	1.220	1.397
A2	2.032	2.921
b	0.610	0.910
b2	1.143	1.778
c	0.356	0.530
D	14.224	16.510
E	9.652	10.668
e1	5.080	5.080
H1	5.842	6.858
L	12.700	14.732
L1	3.400	4.000
Q	2.540	3.429



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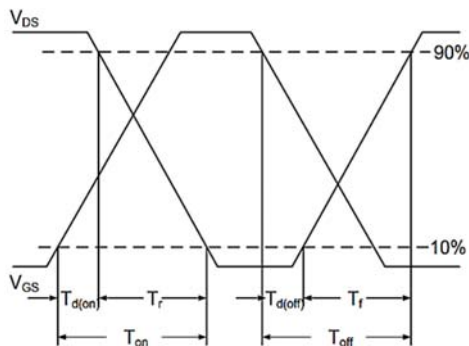
ELECTRICAL CHARACTERISTICS

Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	BV_{DSS}	200	--	--	V
Drain-Source Leakage Current	$V_{DS}=160V, V_{GS}=0V$	I_{DSS}	--	--	1	μA
Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	I_{GSS}	--	--	± 100	nA
Forward Transconductance	$V_{DS}=10V, I_D=15A$	g_{FS}	--	30	--	S
On Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=10A$	$R_{DS(ON)}$	--	28	36	m Ω
Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	$V_{GS(th)}$	2	--	4	V
Dynamic Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Total Gate Charge	$V_{DS}=100V, V_{GS}=10V, I_D=15A$	Q_g	--	76	--	nC
Gate-Source Charge		Q_{gs}	--	14	--	
Gate-Drain Charge		Q_{gd}	--	26	--	
Turn-On Delay Time	$V_{DS}=100V, V_{GS}=10V, I_D=15A, R_{GS}=5.6\Omega$	$T_{d(on)}$	--	32	--	ns
Rise Time		T_r	--	34	--	
Turn-Off Delay Time		$T_{d(off)}$	--	88	--	
Fall Time		T_f	--	32	--	
Input Capacitance	$V_{DS}=100V, V_{GS}=0V, F=1MHz$	C_{iss}	--	3450	--	pF
Output Capacitance		C_{oss}	--	180	--	
Reverse Transfer Capacitance		C_{rss}	--	45	--	
Gate Resistance	$F=1MHz$	R_g	--	1.3	--	
Drain-Source Body Diode	Conditions	Symbol	Min	Typ.	Max	Unit
Reverse Recovery Time	$I_F=15A, dI_F/dt=100A/\mu s$	t_{rr}	--	86	--	ns
Reverse Recovery Charge		Q_{rr}	--	375	--	nC
Diode Forward Voltage	$V_{GS}=0V, I_S=10A$	V_{SD}	--	0.76	1.2	V

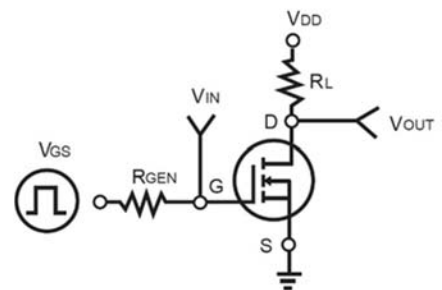
Note:

1. Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$
2. Essentially Independent of operating temperature typical characteristics.
3. Guaranteed by design, not subject to production testing.

Switching Time Waveform



Switching Test Circuit



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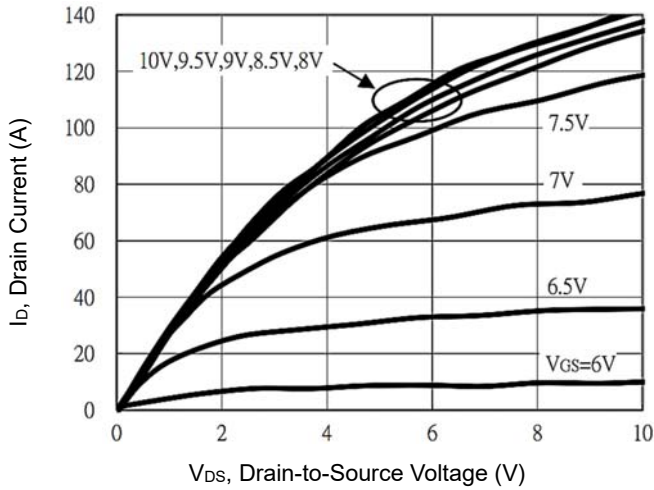
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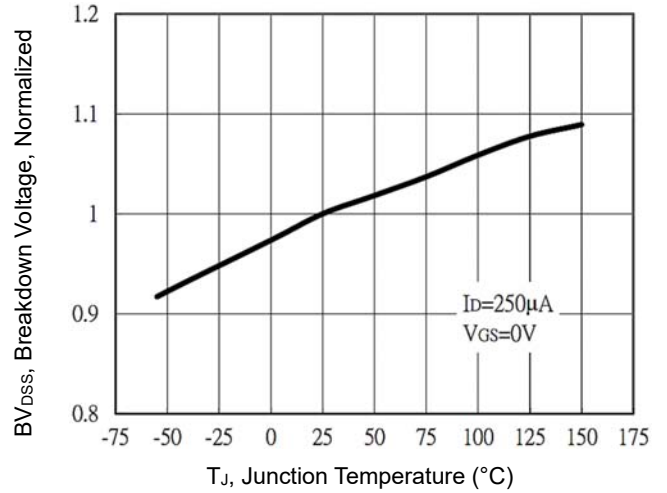
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CHARACTERISTICS CURVES

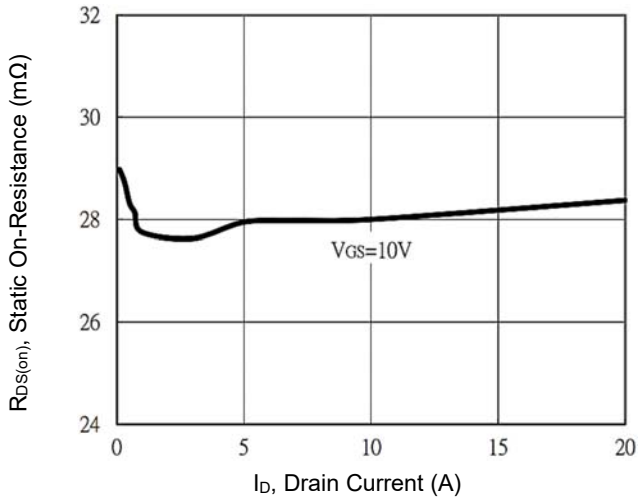
Typical Output Characteristics



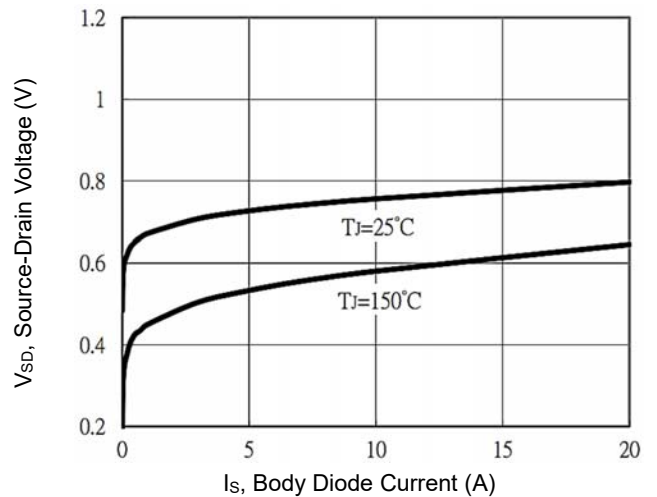
Breakdown Voltage vs. Ambient Temperature



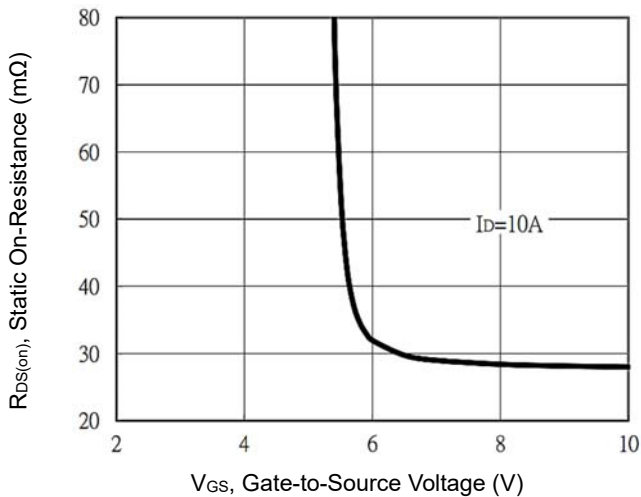
Static $R_{DS(ON)}$ vs Drain Current



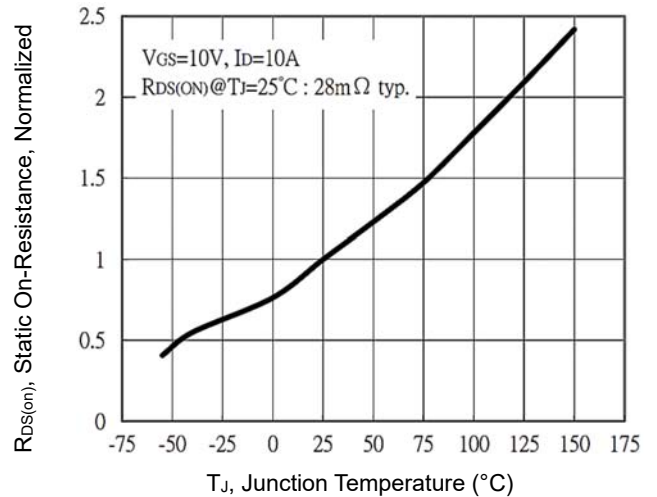
Body Diode Current vs. Source-Drain Voltage



Static On-Resistance vs. Gate Source Voltage



On-Resistance vs. Junction Temperature



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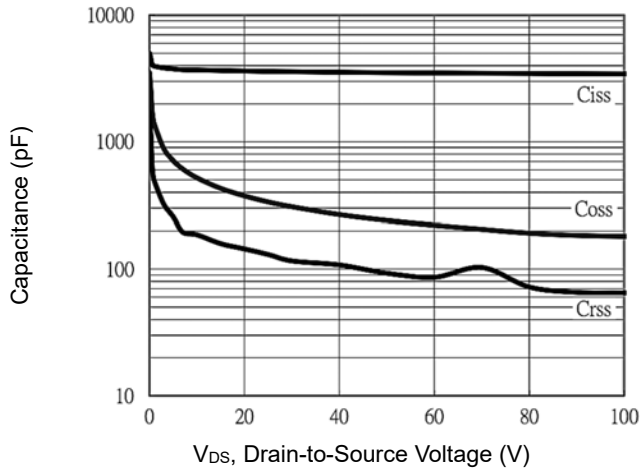
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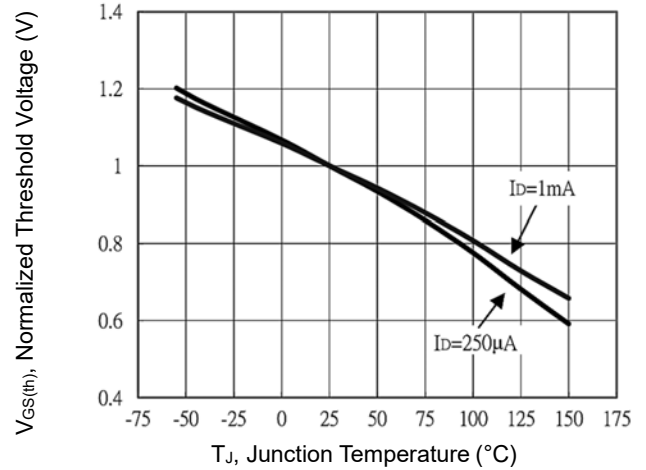
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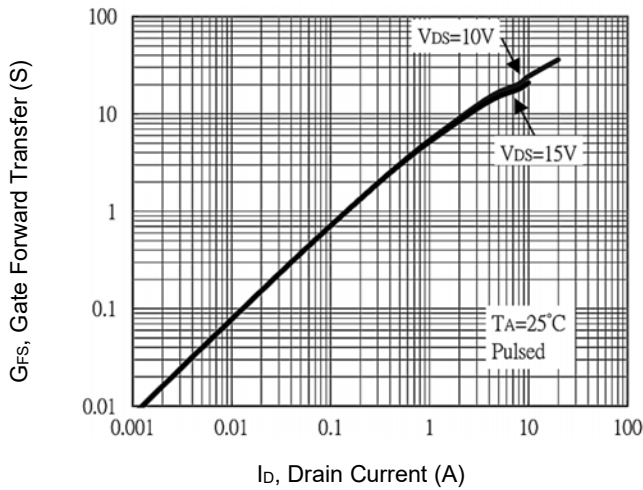
Capacitance vs. Drain-Source Voltage



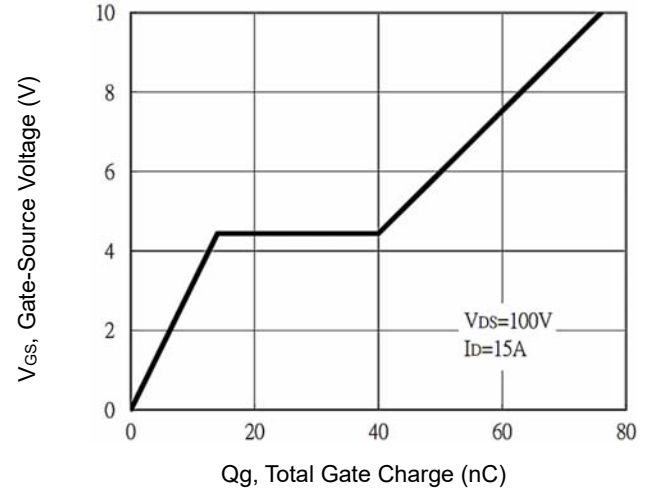
Threshold Voltage vs. Junction Temperature



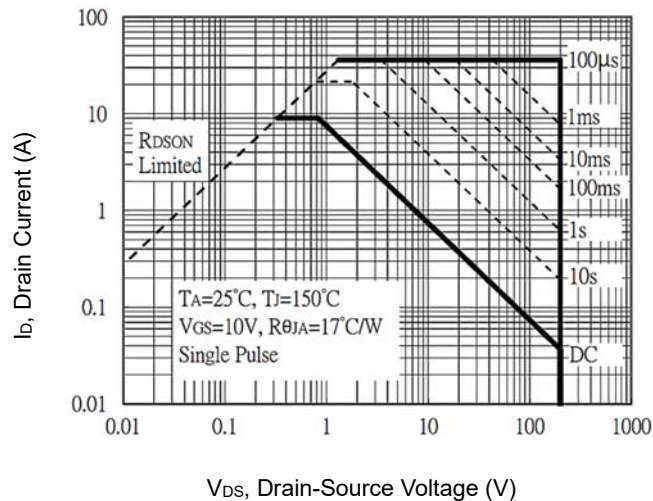
Forward Transfer Admittance vs. Drain Current



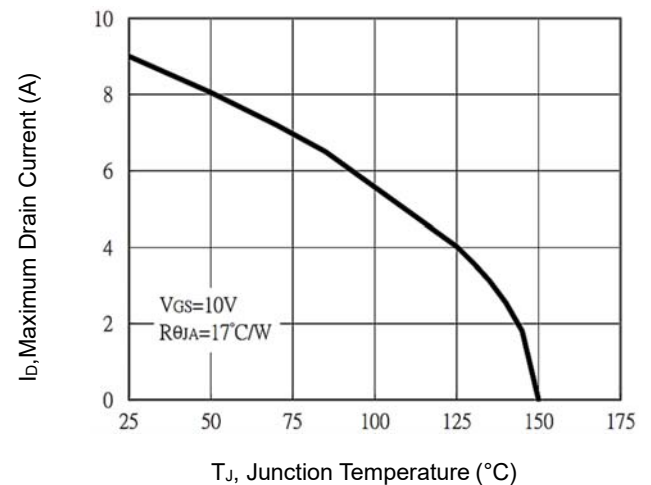
Gate Charge Characteristics



Maximum Safe Operating Area



Maximum Drain Current vs. Junction Temperature

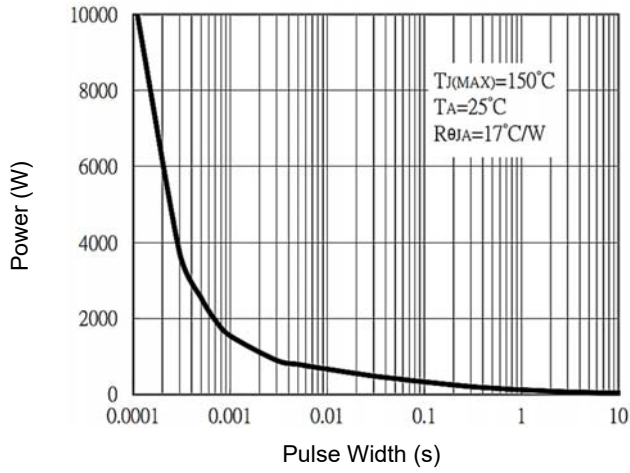


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CHARACTERISTICS CURVES

Single Pulse Power Rating, Junction to Ambient



Transient Thermal Response Curves

