

P-Channel MOSFET

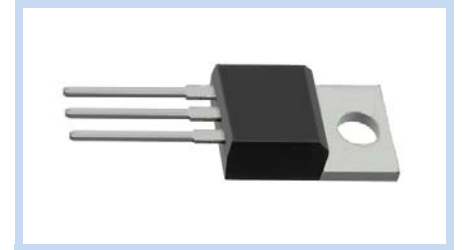
60V 78A 156W TO-220

MFT6P78T220

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FEATURE

- $R_{DS(ON)} < 16m\Omega$ at $V_{GS} = -10V$, $I_D = -10A$
- High Power and Current Handling Capability
- Super High Dense Cell Design for Extremely Low $R_{DS(ON)}$
- Low Gate Charge
- Fast Switching Characteristic



MECHANICAL DATA

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



MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	± 20	
Drain Current – Continuous	I_D	$V_{GS} = -10V$, $T_C = 25^\circ C$	-78
		$V_{GS} = -10V$, $T_C = 100^\circ C$	-50
		$V_{GS} = -10V$, $T_A = 25^\circ C$	-18
		$V_{GS} = -10V$, $T_A = 70^\circ C$	-14
Drain Current – Pulsed	I_{DM}	-240	A
Body Diode Forward Current – Continuous	I_S	-75	
Body Diode Forward Current – Pulsed	I_{SM}	-240	
Power Dissipation	P_D	$T_C = 25^\circ C$	156
		$T_C = 100^\circ C$	63
		$T_A = 25^\circ C$	7.8
		$T_A = 70^\circ C$	5
Single Pulsed Avalanche Energy	E_{AS}	162	mJ
Single Pulsed Avalanche Current	I_{AS}	-38	A
Thermal Resistance Junction to Ambient	$R_{\theta JA}$	16	$^\circ C/W$
Thermal Resistance Junction to Case	$R_{\theta JC}$	0.8	$^\circ C/W$
Operating Junction and Storage Temperature	T_J, T_{STG}	-55 to 150	$^\circ C$

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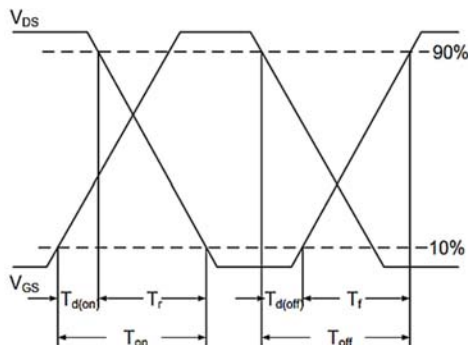
ELECTRICAL CHARACTERISTICS

Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	BV_{DSS}	-60	--	--	V
Drain-Source Leakage Current	$V_{DS}=-48V, V_{GS}=0V$	I_{DSS}	--	--	-1	μA
Gate-Body Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	I_{GSS}	--	--	± 100	nA
On Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Static Drain-Source On-Resistance	$V_{GS}=-10V, I_D=-10A$	$R_{DS(ON)}$	--	12	16	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	$V_{DS}=-30V, V_{GS}=-10V, I_D=-10A$	Q_g	--	64	--	nC
Gate-Source Charge		Q_{gs}	--	12	--	
Gate-Drain Charge		Q_{gd}	--	22	--	
Turn-On Delay Time	$V_{DS}=-30V, V_{GS}=-10V, R_G=1\Omega, I_D=-10A$	$T_{d(on)}$	--	28	--	ns
Rise Time		T_r	--	23	--	
Turn-Off Delay Time		$T_{d(off)}$	--	61	--	
Fall Time		T_f	--	16	--	
Input Capacitance	$V_{DS}=-30V, V_{GS}=0V, F=1MHz$	C_{iss}	--	3465	--	pF
Output Capacitance		C_{oss}	--	375	--	
Reverse Transfer Capacitance		C_{rss}	--	229	--	
Drain-Source Body Diode	Conditions	Symbol	Min	Typ.	Max	Unit
Diode Forward Voltage	$V_{GS}=0V, I_S=-10A$	V_{SD}	--	-0.8	-1.2	V
Reverse Recovery Time	$I_D=-10A, dI_F/dt = 100A/\mu s$	T_{rr}	--	21	--	ns
Reverse Recovery Charge		Q_{rr}	--	19	--	nC

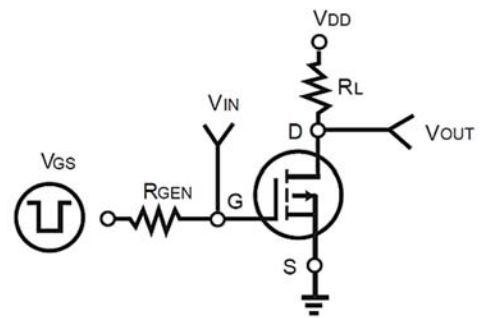
Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature $T_{J(MAX)} = 150^\circ C$.
2. Ratings are based on low frequency and low duty cycles to keep initial $T_J = 25^\circ$
3. The power dissipation P_D is based on $T_{J(MAX)} = 150^\circ C$, using junction junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.
4. The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2 oz. copper, in a still air environment with $T_A = 25^\circ C$. The power dissipation P_D is based on $R_{\theta JA}$ and the maximum allowed junction temperature of $150^\circ C$. The value in any given application depends on the user's specific board design.
5. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$
6. Independent of operating temperature

Switching Time Waveform

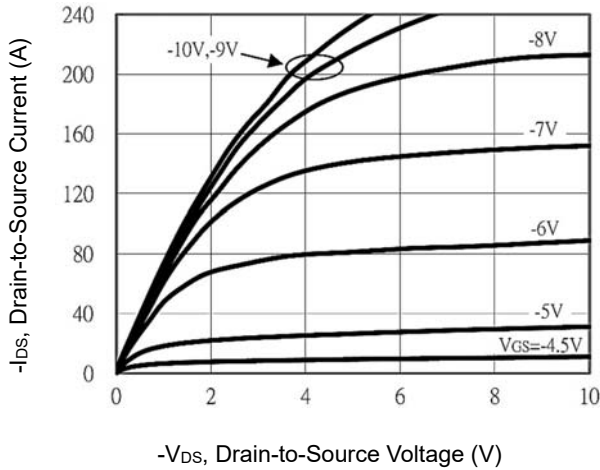


Switching Test Circuit

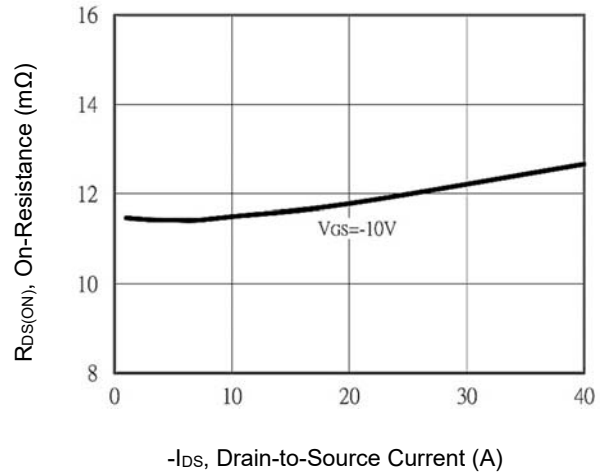


CHARACTERISTIC CURVES

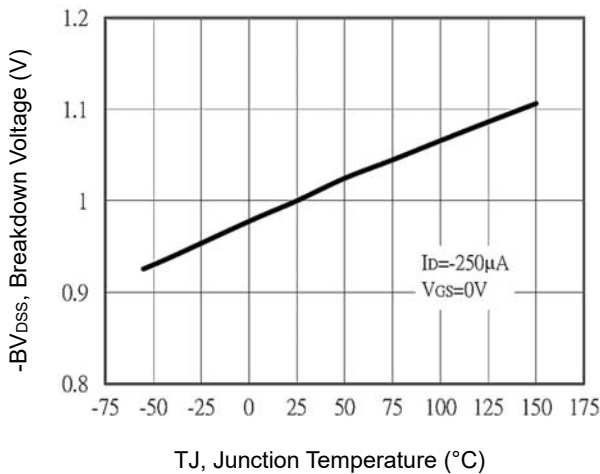
Output Characteristics



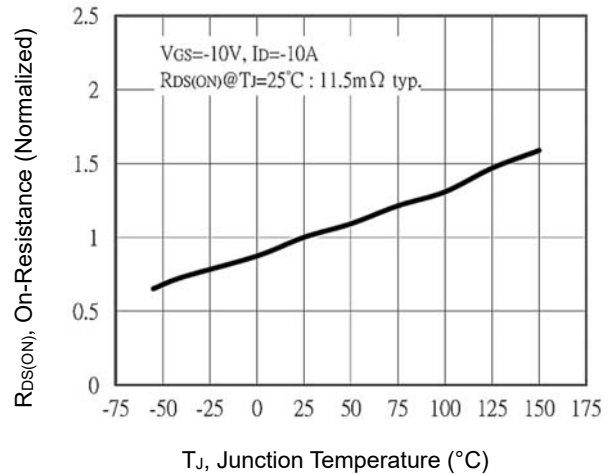
On-Resistance vs Drain Current



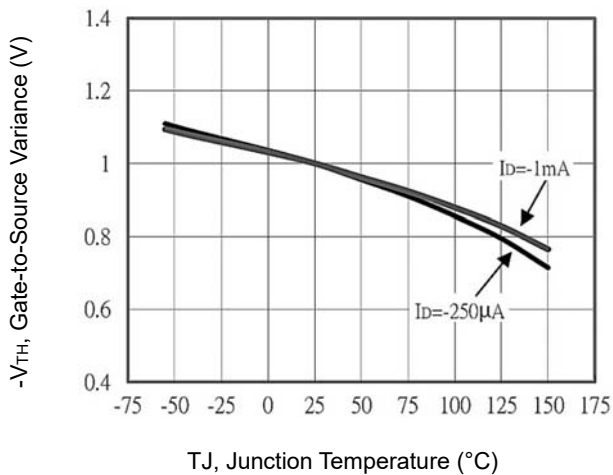
Breakdown Voltage vs. Temperature



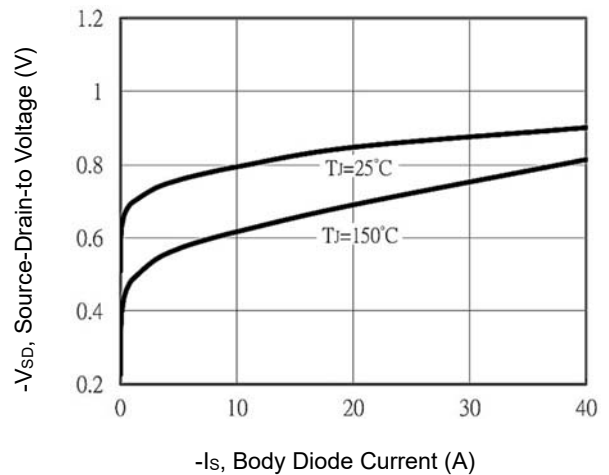
On-Resistance vs. Junction temperature



Threshold Voltage Variance vs. Temperature



Body Diode Characteristics



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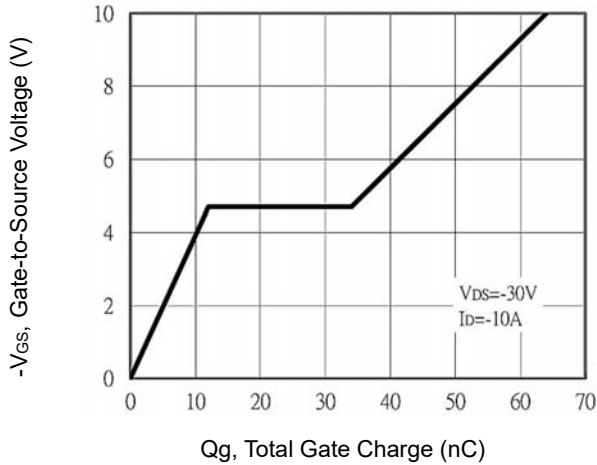
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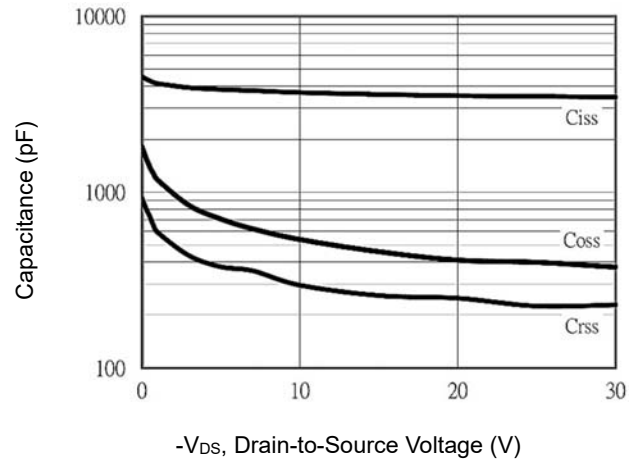
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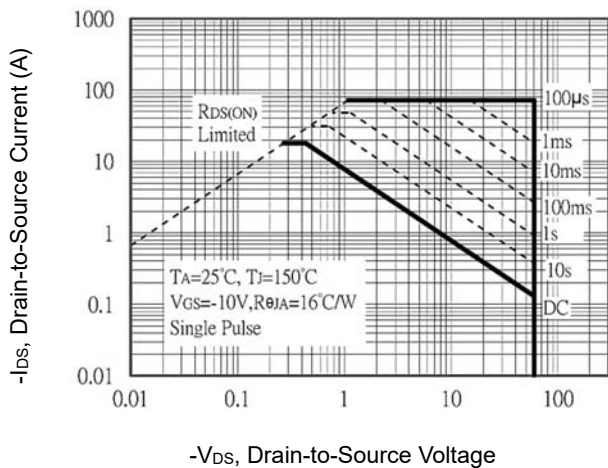
Gate-Charge Characteristics



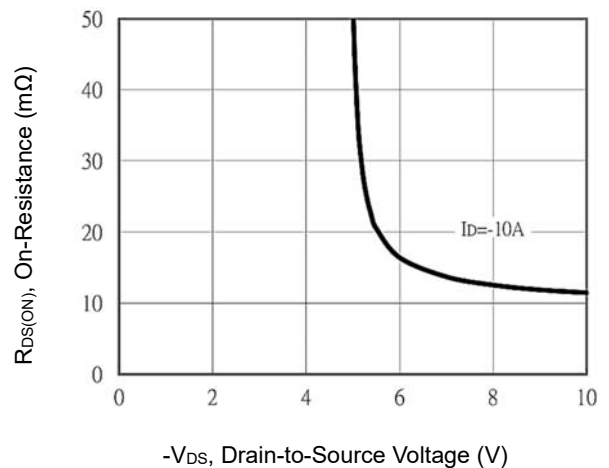
Capacitance vs. Drain-Source Voltage



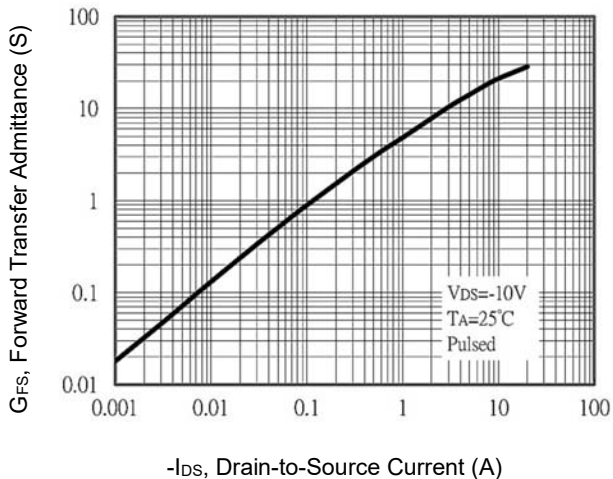
Maximum Safe Operating Area



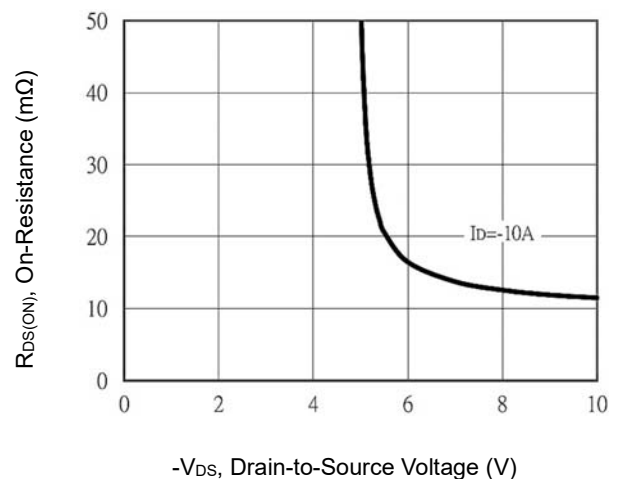
On-Resistance vs. Drain-Source Voltage



Forward Transfer Admittance vs Drain Current



Maximum Drain Current vs Junction Temperature



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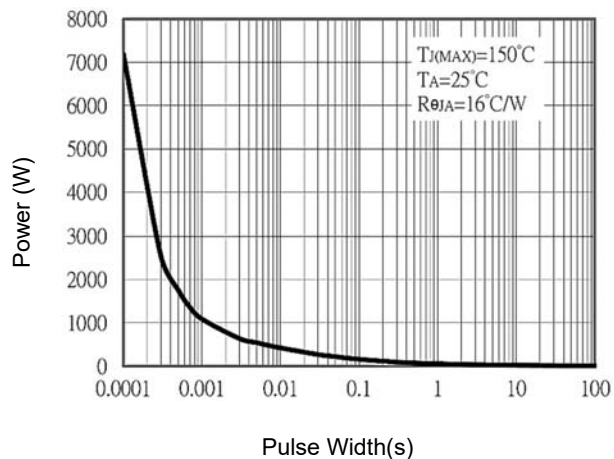
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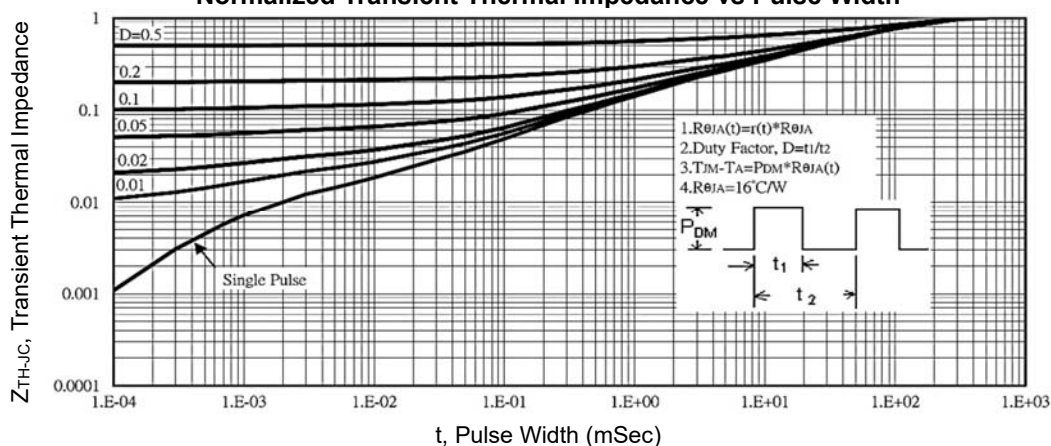
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CHARACTERISTIC CURVES

Single Pulse Power Rating



Normalized Transient Thermal Impedance vs Pulse Width



DIMENSIONS

Item	Min (mm)	Max (mm)
A	4.40	4.60
A1	1.20	1.40
A2	2.25	2.55
b	0.71	0.91
b2	1.17	1.37
c	0.33	0.65
D	15.45	12.75
E	9.91	10.25
e1	4.98	5.18
H1	6.10	6.40
L	12.90	13.40
L1	2.85	3.25
P	3.40	3.80
Q	2.65	2.95

