

N-Channel MOSFET

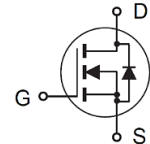
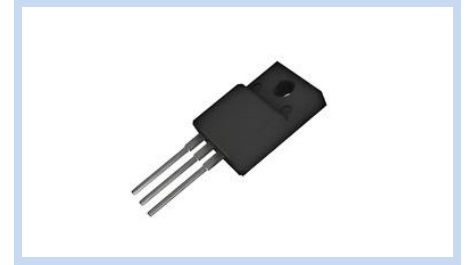
650V 20A 85W TO-220F

MFT65N20T220F

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FEATURE

- $R_{DS(ON)} < 450m\Omega$, $V_{GS}=10V$, $I_D=10A$
- Fast Switching
- High Density Cell Design for Low $R_{ds(on)}$
- Application: DC/DC Converter, High-Frequency Switching and Synchronous Rectification

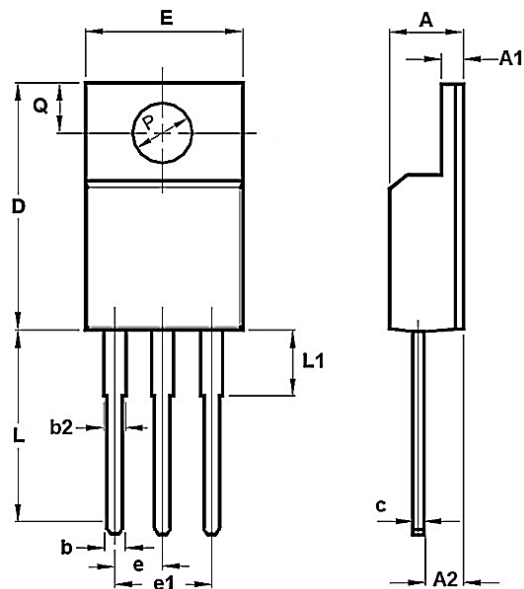


MAXIMUM RATINGS

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage		V_{GS}	± 30	V
Drain Current – Continuous	$T_C=25^\circ C$	I_D	20	A
Drain Current – Pulsed		I_{DM}	80	A
Power Dissipation	$T_C=25^\circ C$	P_D	85	W
Single Pulse Avalanche Energy		E_{AS}	445	mJ
Thermal Resistance, Junction to Case		$R_{\theta JC}$	1.47	$^\circ C/W$
Operating Junction and Storage Temperature		T_J, T_{STG}	-55 to +150	$^\circ C$

DIMENSIONS

Item	Min. (mm)	Max. (mm)
A	4.30	4.70
A1	2.80	3.20
A2	2.50	2.90
b	0.50	0.75
b2	1.10	1.75
c	0.50	0.75
D	14.80	15.20
E	9.96	10.36
e	2.54 TYP	
e1	5.08 TYP	
L	12.80	13.20
L1	2.60	3.00
Q	2.70 REF	
P	3.50 REF	



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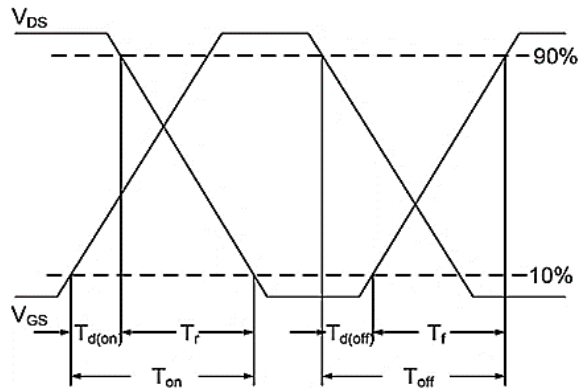
ELECTRICAL CHARACTERISTICS

Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	BV_{DSS}	650	--	--	V
Zero Gate Voltage Drain Current	$V_{DS}=520V, V_{GS}=0V, T_J=25^\circ C$	I_{DSS}	--	--	1	μA
Gate-Body Leakage Current	$V_{GS}=\pm 30V, V_{DS}=0V$	I_{GSS}	--	--	± 100	nA
On Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=10A$	$R_{DS(ON)}$	--	350	450	m Ω
Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	$V_{GS(th)}$	2.0	3.0	4.0	V
Dynamic Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Total Gate Charge	$V_{DS}=325V, V_{GS}=10V, I_D=20A$	Q_g	--	64	--	nC
Gate-Source Charge		Q_{gs}	--	13	--	
Gate-Drain Charge		Q_{gd}	--	24	--	
Turn-On Delay Time	$V_{DD}=325V, V_{GS}=10V, R_G=25\Omega, I_D=20A$	$T_{d(on)}$	--	34	--	nS
Rise Time		T_r	--	81	--	
Turn-Off Delay Time		$T_{d(off)}$	--	178	--	
Fall Time		T_f	--	93	--	
Input Capacitance	$V_{DS}=25V, V_{GS}=0V, f=1MHz$	C_{iss}	--	2431	--	pF
Output Capacitance		C_{oss}	--	217	--	
Reverse Transfer Capacitance		C_{rss}	--	21	--	

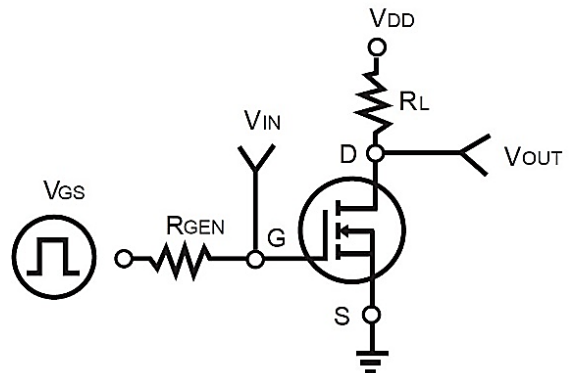
Note:

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2oz copper.
2. The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. The EAS data shows Max. rating. The test condition is $R_G=30\Omega, L=10mH$.
2. Guaranteed by design, not subject to production testing.

Switching Time Waveform



Switching Test Circuit



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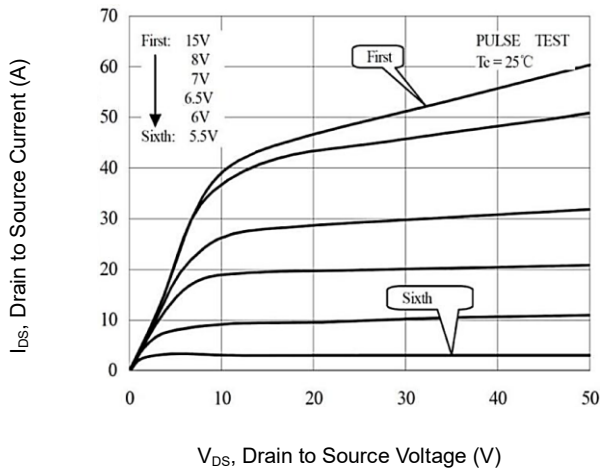
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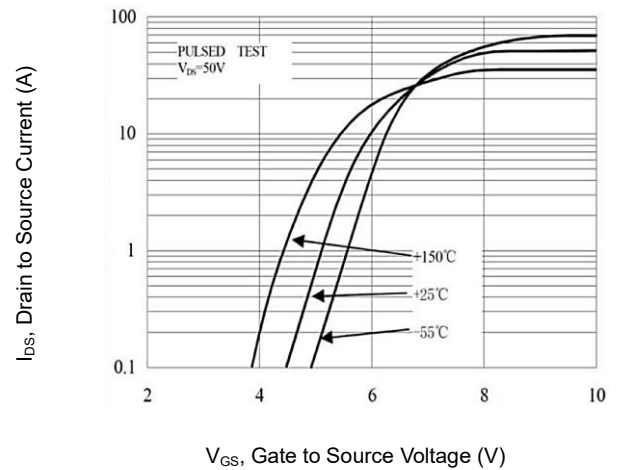
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CHARACTERISTIC CURVES

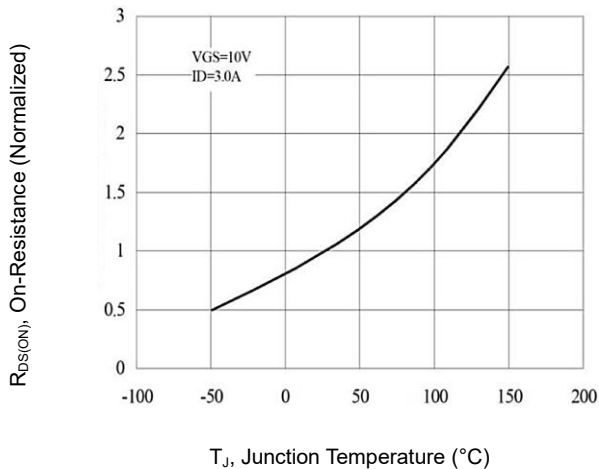
Output Characteristics



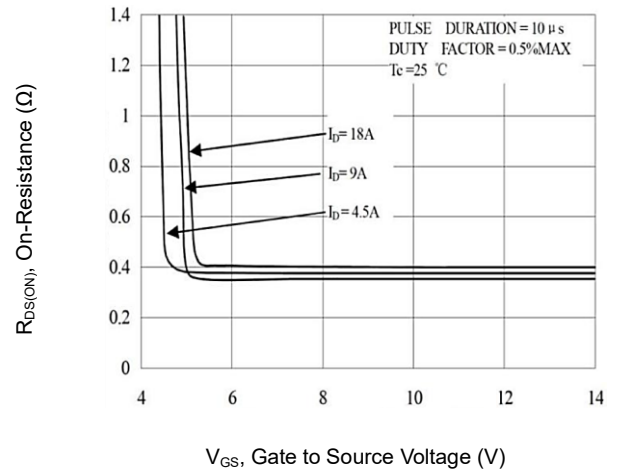
Transfer Characteristics



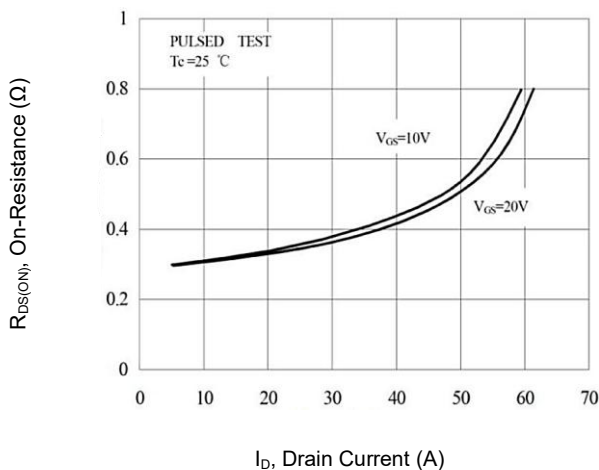
On-Resistance vs. Junction Temperature



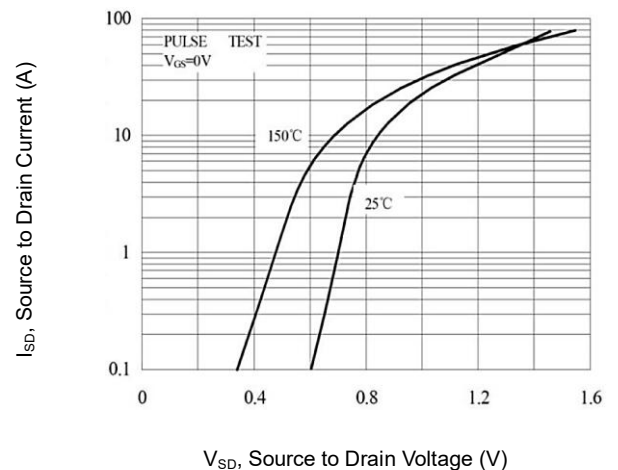
On-Resistance vs. Gate Voltage and Drain Current



On-Resistance vs. Drain Current and Gate Voltage



Body Diode Characteristics



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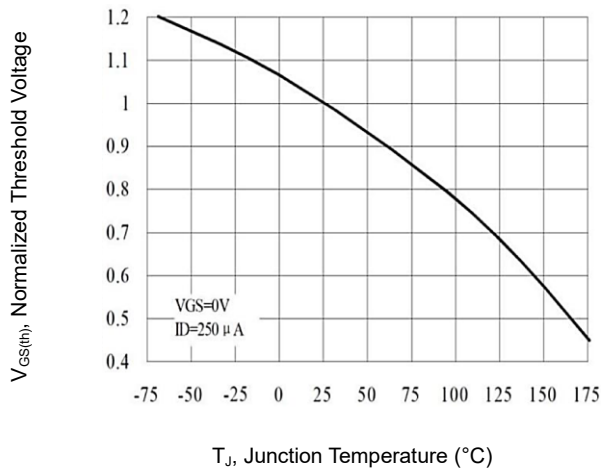
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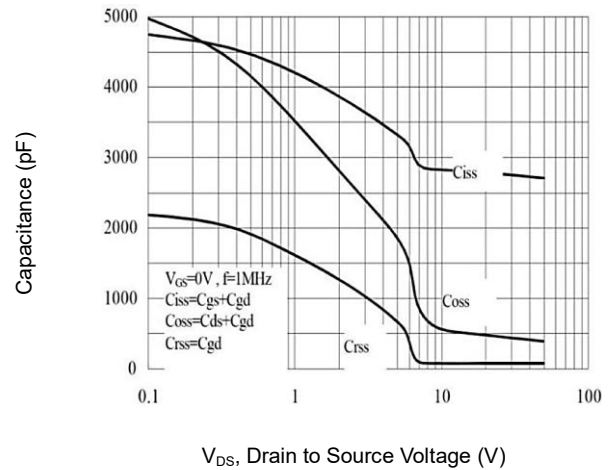
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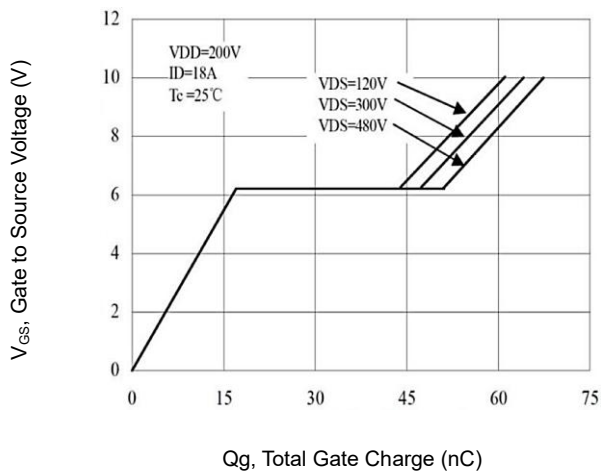
Threshold Voltage vs. Junction Temperature



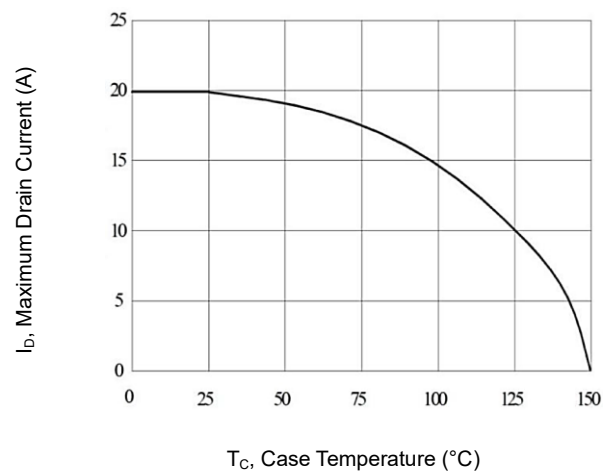
Capacitance



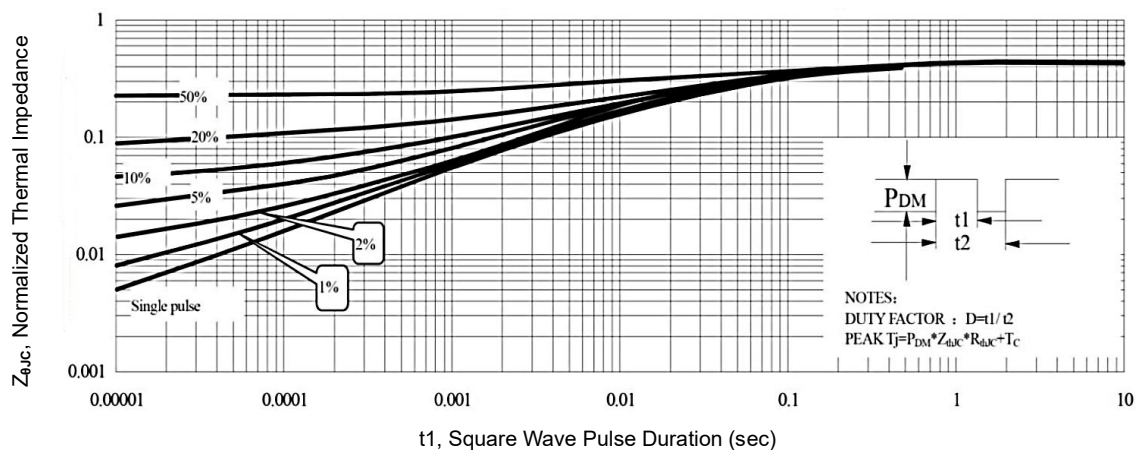
Gate Charge Characteristics



Maximum Drain Current vs. Temperature



Maximum Effective Thermal Impedance



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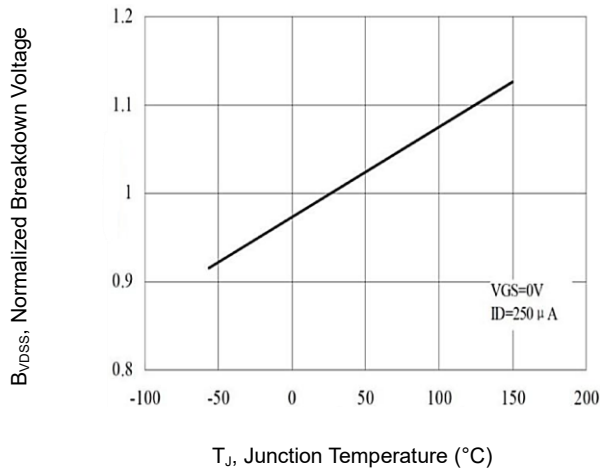
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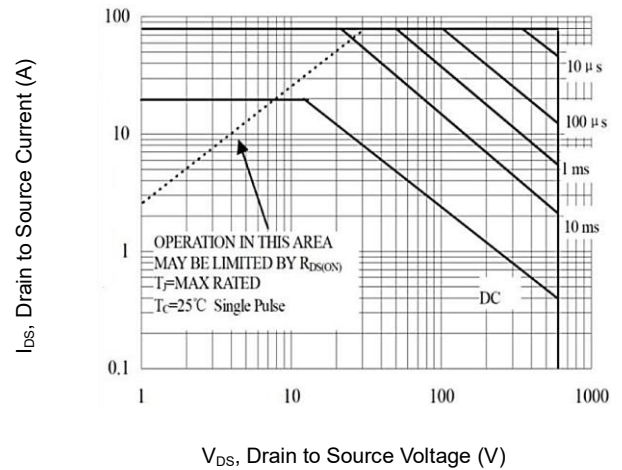
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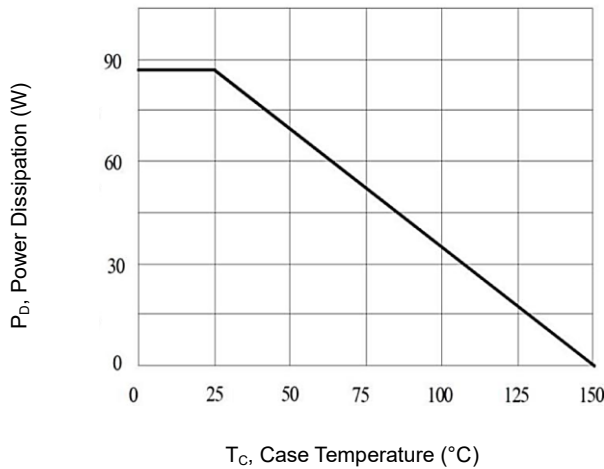
Breakdown Voltage vs. Temperature



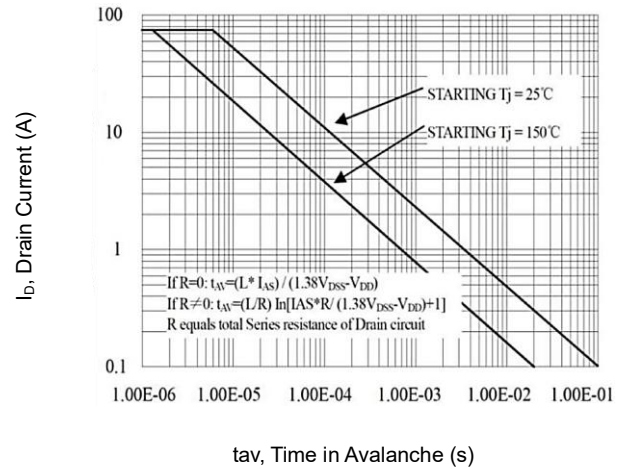
Maximum Safe Operating Area



Power Derating Curve



Unclamped Inductive Switching Capability



Maximum Peak Current Capability

