

N-Channel MOSFET

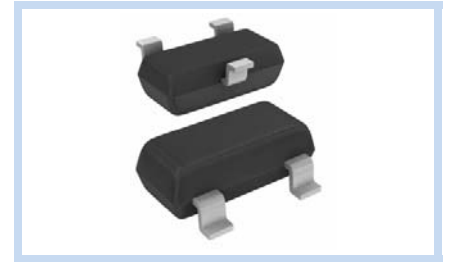
50V 500mA 500mW SOT-23 ESD

MFT5NA50S23E

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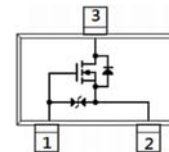
FEATURE

- $R_{DS(ON)} < 1.6\Omega$, $V_{GS}=10V$, $I_D=500mA$
- $R_{DS(ON)} < 2.5\Omega$, $V_{GS}=4.5V$, $I_D=200mA$
- $R_{DS(ON)} < 4.5\Omega$, $V_{GS}=2.5V$, $I_D=100mA$
- Advanced Trench Process Technology
- ESD Protected 2KV HBM



MECHANICAL DATA

- Case: SOT-23 Package
- Terminals: Solderable per MIL-STD-750, Method 2026

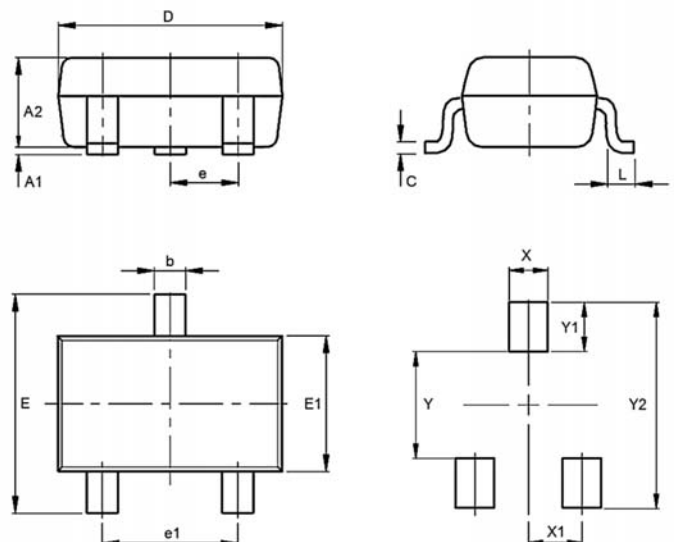


MAXIMUM RATINGS

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	50	V
Gate-Source Voltage		V_{GS}	± 20	V
Drain Current – Continuous		I_D	500	mA
Drain Current – Pulsed		I_{DM}	1200	mA
Power Dissipation	$T_a=25^\circ C$	P_D	500	mW
	Derate above $25^\circ C$		4	mW/ $^\circ C$
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 150	$^\circ C$
Thermal Resistance, Junction-to-Ambient		$R_{\theta JA}$	250	$^\circ C/W$

DIMENSIONS

Item	Min (mm)	Max (mm)
A1	0.00	0.10
A2	0.90	1.10
b	0.35	0.50
C	0.08	0.20
D	2.80	3.04
e	0.90	1.00
e1	1.80	2.00
E	2.20	2.60
E1	1.20	1.40
L	0.15	
X	0.80	
X1	0.95	
Y	1.10	
Y1	0.90	
Y2	2.90	



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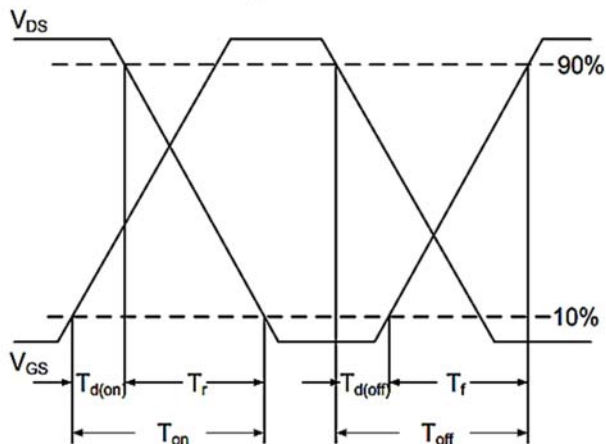
ELECTRICAL CHARACTERISTICS

Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	BV_{DSS}	50	-	-	V
Zero Gate Voltage Drain Current	$V_{DS}=50V, V_{GS}=0V$	I_{DSS}	-	0.01	1	μA
Gate Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	I_{GSS}	-	± 3.0	± 10	
On Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	$V_{GS(th)}$	0.8	1.0	1.5	V
Drain-Source On-Resistance	$V_{GS}=10V, I_D=500mA$	$R_{DS(on)}$	-	0.96	1.6	Ω
	$V_{GS}=4.5V, I_D=200mA$		-	1.25	2.5	
	$V_{GS}=2.5V, I_D=100A$		-	2.73	4.5	
Dynamic Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Total Gate Charge	$V_{DS}=25V, V_{GS}=4.5V, I_D=250mA$	Q_g	-	0.63	1	nC
Gate-Source Charge		Q_{gs}	-	0.20	-	
Gate-Drain Charge		Q_{gd}	-	0.23	-	
Input Capacitance	$V_{DS}=25V, V_{GS}=0V, F=1.0MHz$	C_{iss}	-	25	50	pF
Output Capacitance		C_{oss}	-	9.5	20	
Reverse Transfer Capacitance		C_{rss}	-	2.1	5	
Turn-On Delay Time	$V_{DD}=25V, I_D=500mA, V_{GS}=10V, R_G=6\Omega$	$T_{d(on)}$	-	2.2	5	nS
Turn-On Rise Time		T_r	-	19.2	38	
Turn-Off Delay Time		$T_{d(off)}$	-	6.2	12	
Turn-Off Fall Time		T_f	-	23	50	
Drain-Source Body Diode	Conditions	Symbol	Min	Typ.	Max	Unit
Diode Forward Current	-	I_S	-	-	500	mA
Diode Forward Voltage	$I_S=500mA, V_{GS}=0V$	V_{SD}	-	0.86	1.5	V

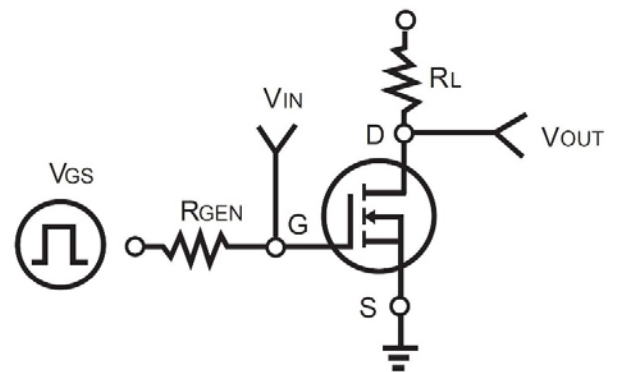
Note:

1. Pulse widths $\leq 300\mu s$, duty cycles $\leq 2\%$
2. Essentially independent of operating temperature typical characteristics
3. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. mounted on a 1-inch square pad of copper
4. Guaranteed by design, not test in mass production

Switching Time Waveform



Switching Test Circuit



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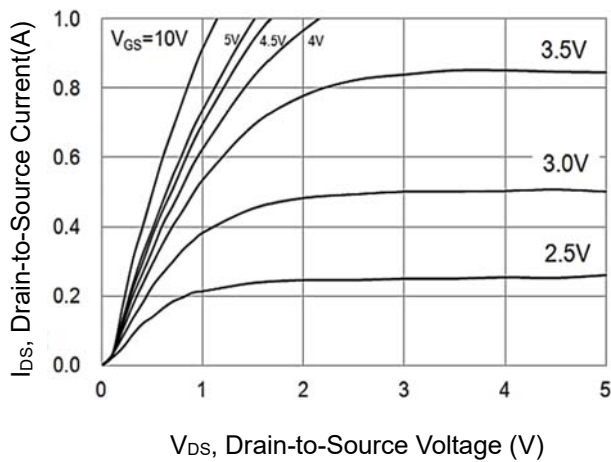
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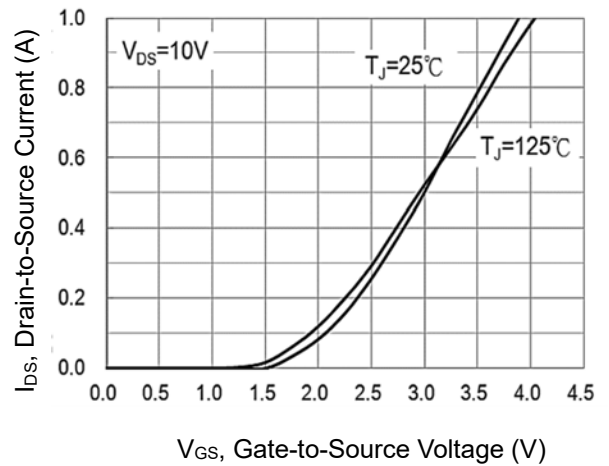
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CHARACTERISTIC CURVES

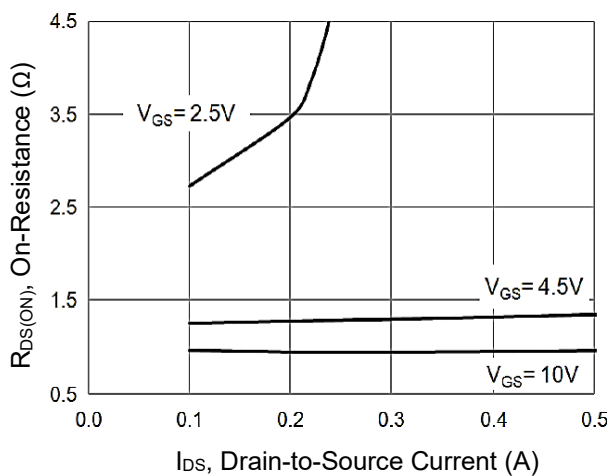
On-Region Characteristics



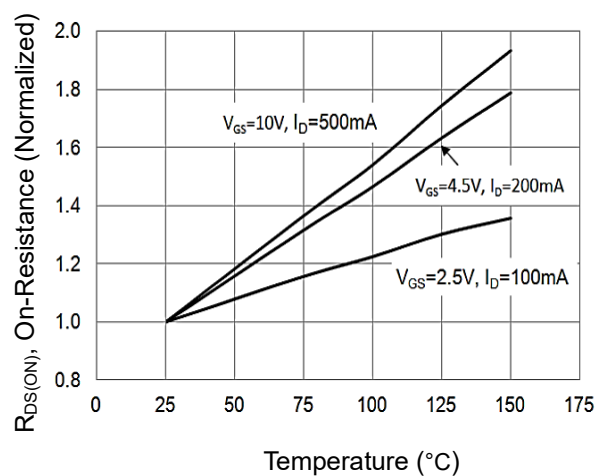
Transfer Characteristics



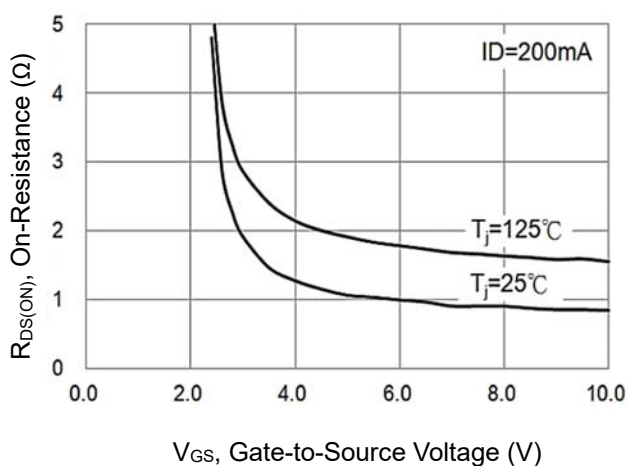
On-Resistance vs. Drain Current



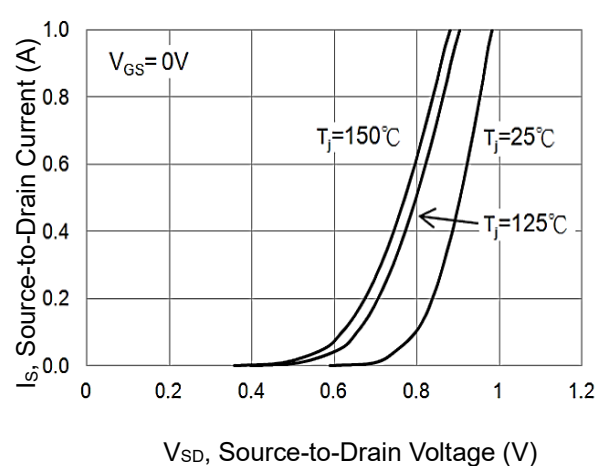
On-Resistance vs. Junction temperature



On-Resistance Variation with VGS



Body Diode Characteristics



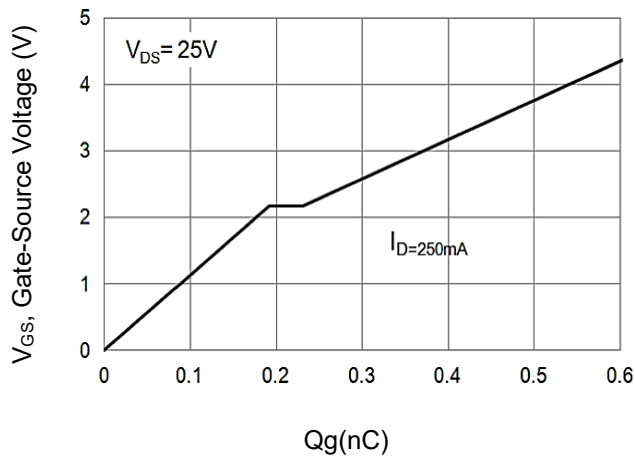
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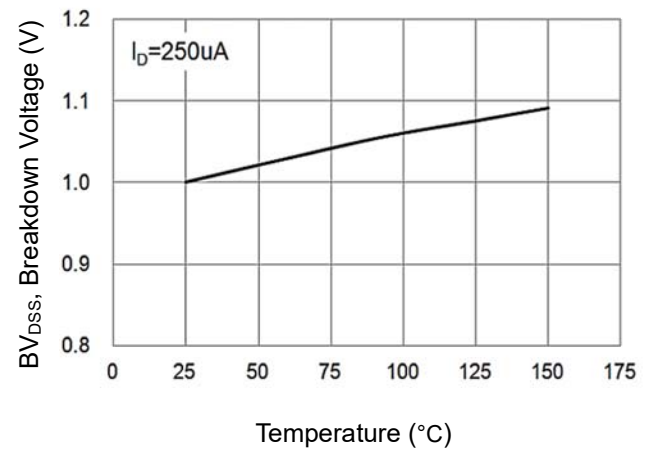
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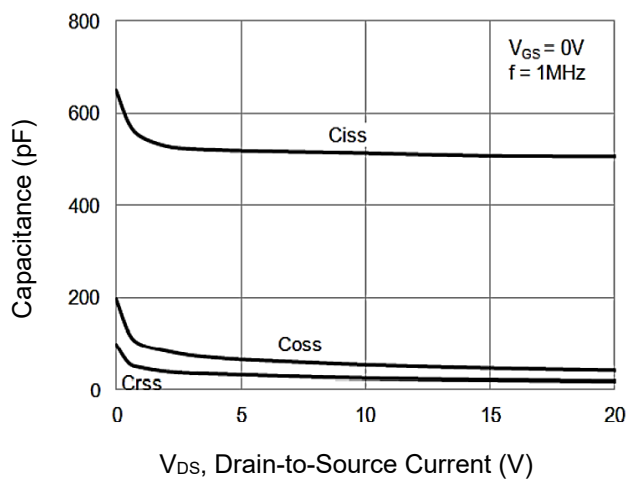
Gate-Charge Characteristics



Breakdown Voltage vs. Temperature



Capacitance vs. Drain-Source Voltage



Threshold Voltage Variation with Temperature

