

# N-Channel MOSFET

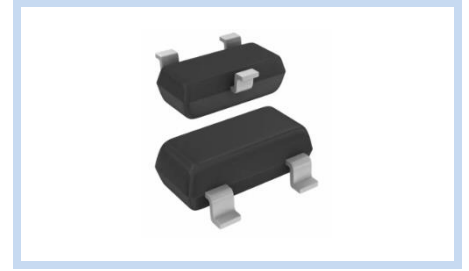
## 30V 4.2A 1.25W SOT-23 ESD

MFT3N4A2S23E

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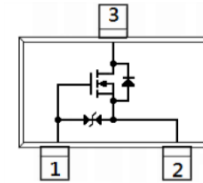
### FEATURE

- $R_{DS(ON)} < 42m\Omega$ ,  $V_{GS}=10V$ ,  $I_D=4.2A$
- $R_{DS(ON)} < 48m\Omega$ ,  $V_{GS}=4.5V$ ,  $I_D=3.5A$
- $R_{DS(ON)} < 55m\Omega$ ,  $V_{GS}=2.5V$ ,  $I_D=2.8A$
- ESD Protected at 900V HBM



### MECHANICAL DATA

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

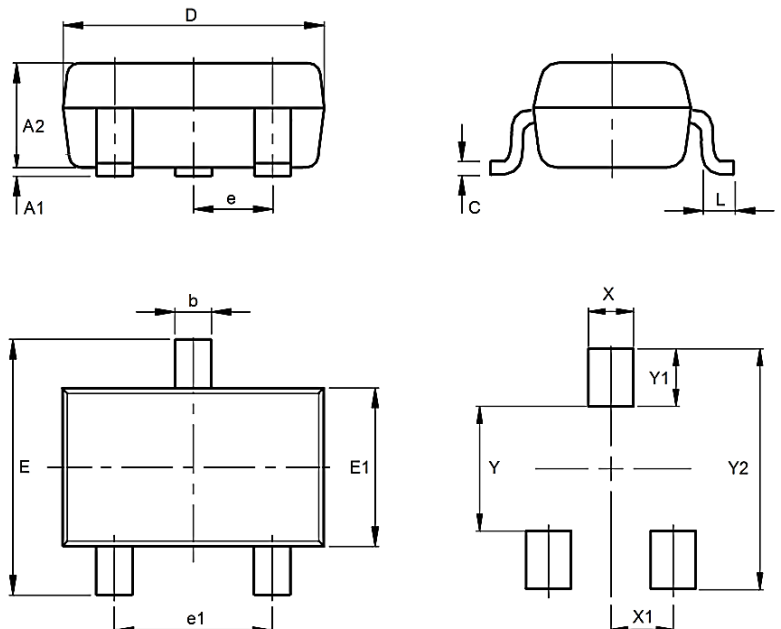


### MAXIMUM RATINGS

Parameter		Symbol	Value	Unit
Drain-Source Voltage		$V_{DS}$	30	V
Gate-Source Voltage		$V_{GS}$	$\pm 12$	V
Drain Current – Continuous		$I_D$	4.2	A
Drain Current – Pulsed	$T_J=25^\circ C$	$I_{DM}$	16.8	A
Single-Pulse Avalanche Current	$T_J=25^\circ C$	$I_{AS}$	24	A
Single-Pulse Avalanche Energy	$T_J=25^\circ C$	$E_{AS}$	28.8	mJ
Power Dissipation		$P_D$	1.25	W
Operating Junction Temperature and Storage Temperature		$T_J$	-55 to 150	$^\circ C$
ESD susceptibility		ESD	900	V
Thermal Resistance, Junction to Ambient		$R_{\theta JA}$	125	$^\circ C / W$

### 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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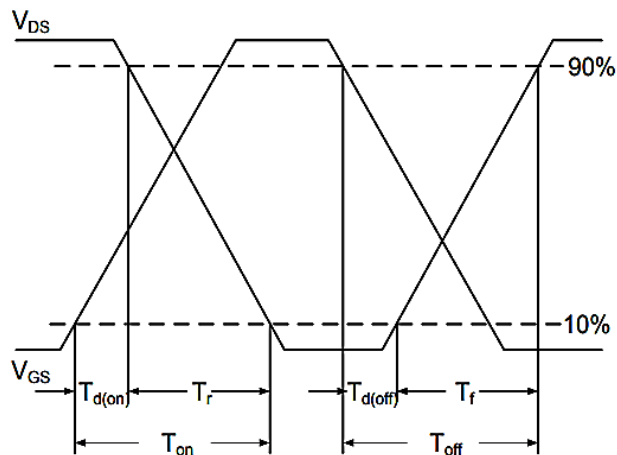
### ELECTRICAL CHARACTERISTICS

Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	$BV_{DSS}$	30	--	--	V
Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	$V_{GS(th)}$	0.48	--	1.6	V
Gate Leakage Current	$V_{DS}=0V, V_{GS}=\pm 12V$	$I_{GSS}$	--	--	$\pm 10$	$\mu A$
Zero Gate Voltage Drain Current	$V_{DS}=30V, V_{GS}=0V$	$I_{DSS}$	--	--	0.1	$\mu A$
On Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=4.2A$	$R_{DS(on)}$	--	--	42	m $\Omega$
	$V_{GS}=4.5V, I_D=3.5A$		--	--	48	m $\Omega$
	$V_{GS}=2.5V, I_D=2.8A$		--	--	55	m $\Omega$
Dynamic Characteristics	Conditions	Symbol	--	Typ.	Max	Unit
Input Capacitance	$V_{DS}=15V, V_{GS}=0V$ $F=1.0MHz$	$C_{iss}$	--	386	--	pF
Output Capacitance		$C_{oss}$	--	37	--	pF
Reverse Transfer Capacitance		$C_{rss}$	--	10	--	pF
Turn-On Delay Time		$T_{d(on)}$	--	1138	--	nS
Rise Time	$V_{DS}=15V, I_D=1A,$ $V_{GS}=10V, R_G=1\Omega$	$T_r$	--	68	--	nS
Turn-Off Delay Time		$T_{d(off)}$	--	892	--	nS
Fall Time		$T_f$	--	98	--	nS
Total Gate Charge		$Q_g$	--	14.5	--	nC
Gate-Source Charge	$V_{DS}=15V, V_{GS}=10V, I_D=4.2A$	$Q_{gs}$	--	1.2	--	nC
Gate-Drain Charge		$Q_{gd}$	--	2.7	--	nC
Diode Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Diode Forward Voltage	$I_S=1A, V_{GS}=0V$	$V_{SD}$	--	0.8	1.2	V
Body Diode Reverse Recovery Time	$I_F=4.2A, di/dt=100A/\mu s$	$t_{rr}$	--	607	--	S

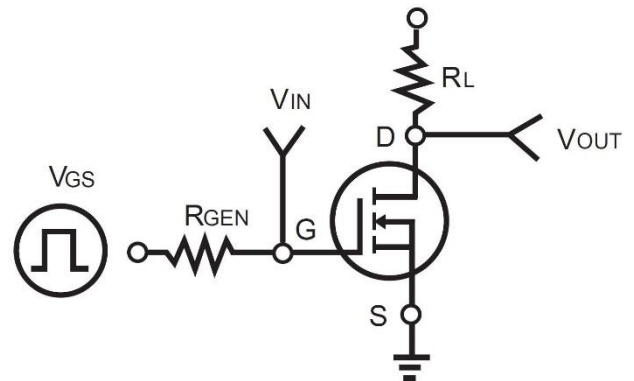
**Note:**

1. Repetitive rating; pulse width limited by max junction temperature
2. Limited by  $T_{Jmax}$ , starting  $T_J=25^\circ C$ ,  $L=0.1mH$ ,  $R_G=25\Omega$ ,  $I_D=24A$ ,  $V_{GS}=10V$ .
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 PCB described
4. Device mounted on an FR4 substrate PC board, 2oz copper, with 1-inch square copper plate.
5. HBM ( $C=100pF$ ,  $R=1.5K\Omega$ )
6.  $T_A=25^\circ C$ , unless otherwise specified.

Switching Time Waveform

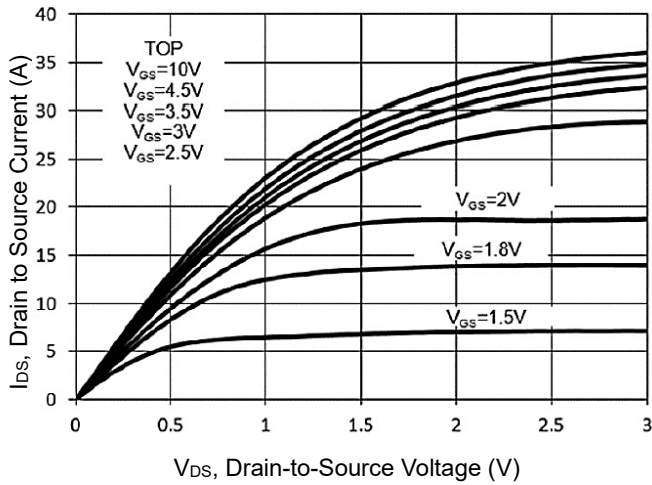


Switching Test Circuit

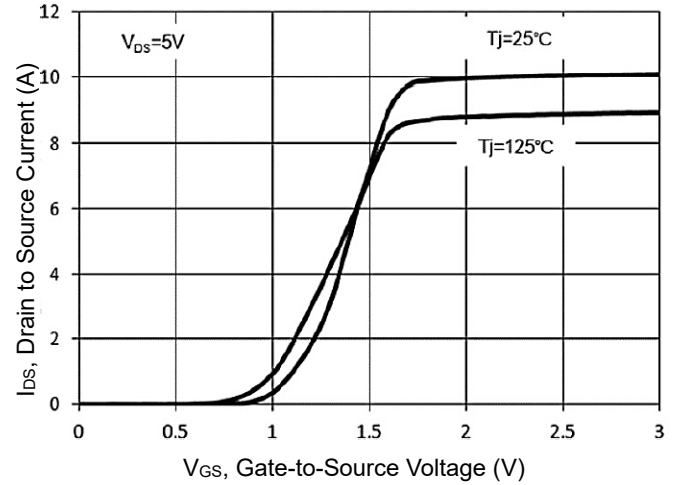


**CHARACTERISTIC CURVES**

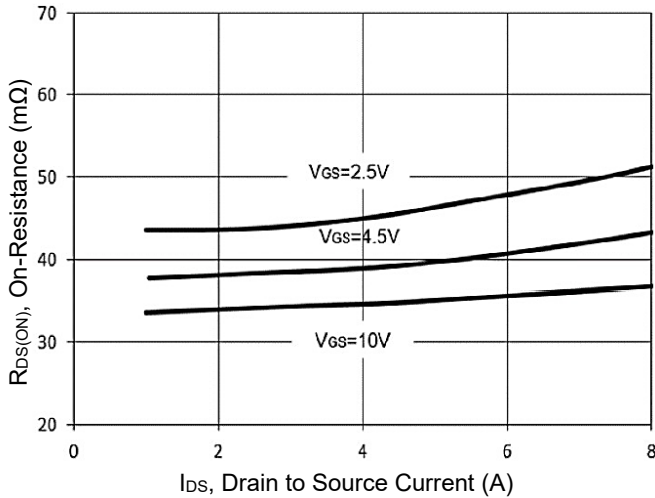
**On Region Characteristics**



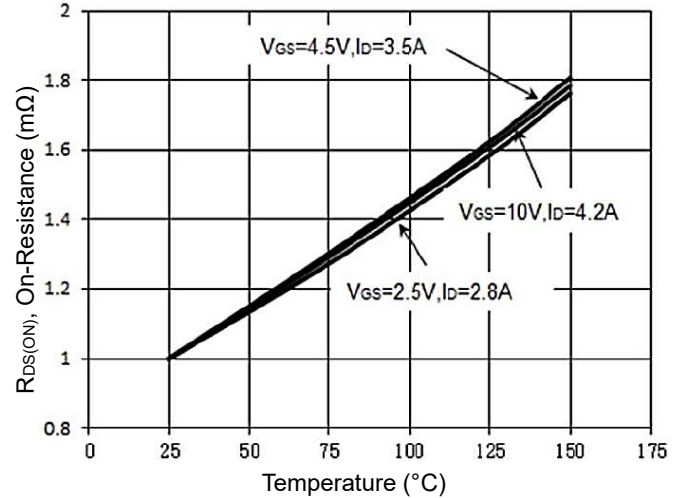
**Transfer Characteristics**



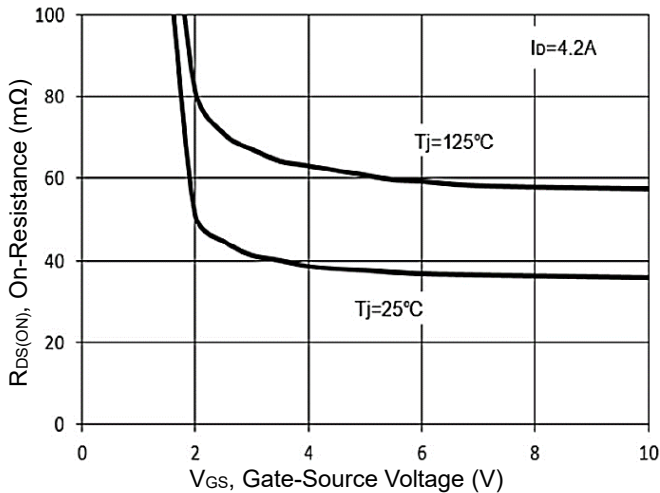
**On-Resistance vs. Drain Current**



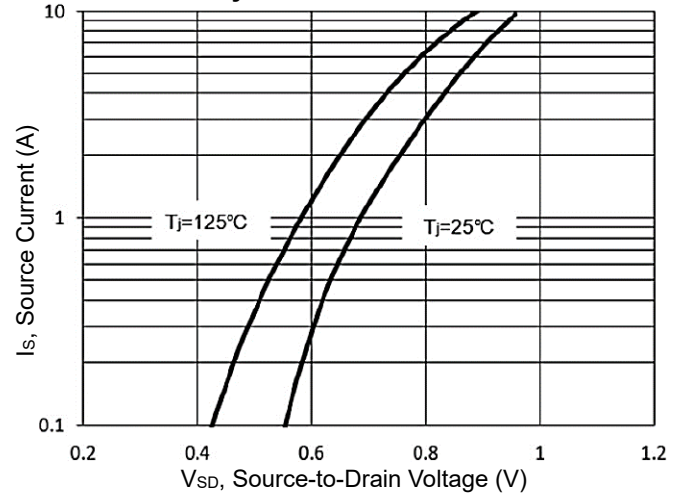
**On-Resistance vs. Junction Temperature**



**On-Resistance Variation with Vgs**



**Body Diode Characteristics**



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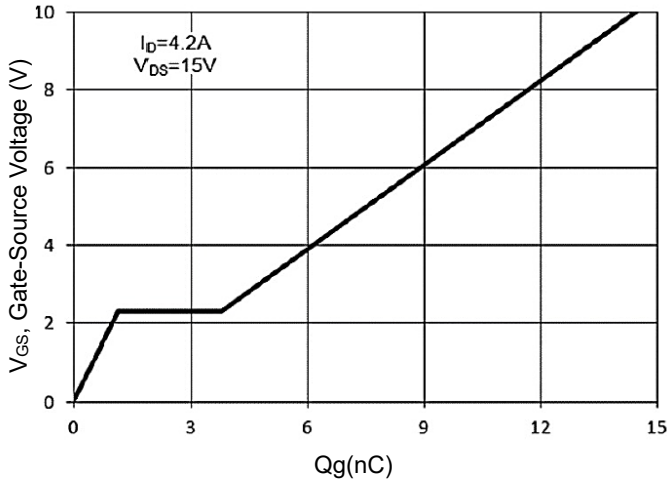
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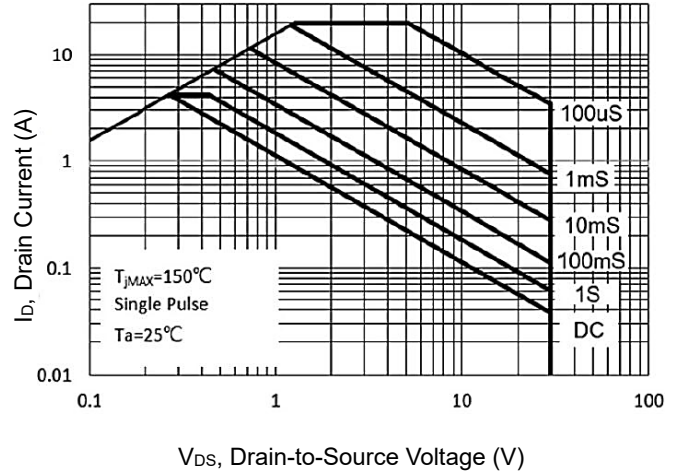
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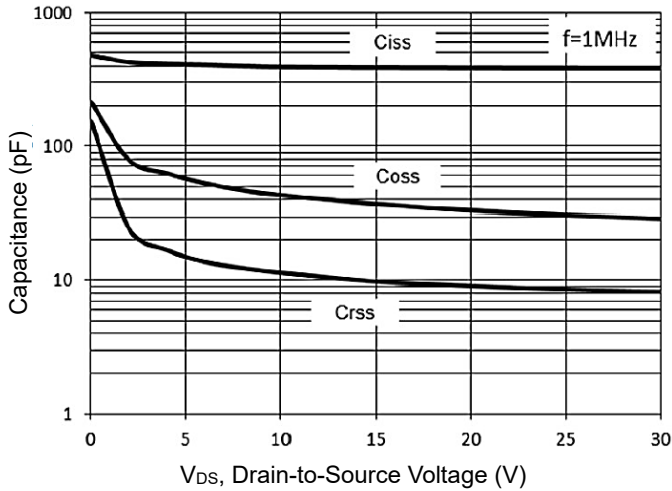
Gate Charge Characteristics



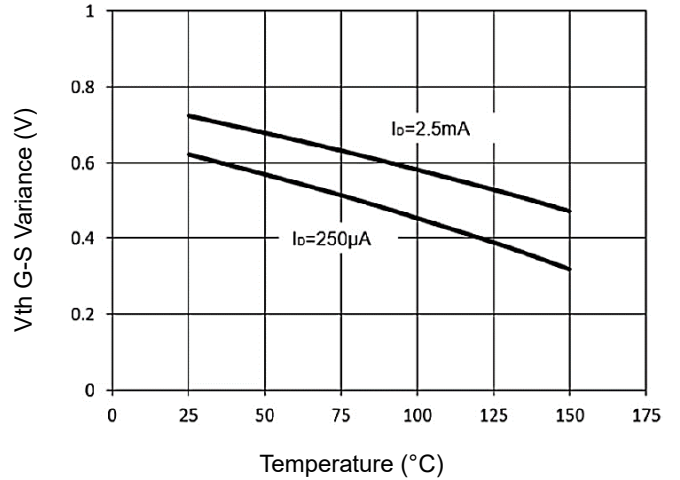
Maximum Safe Operating Area



Capacitance vs. Drain-Source Voltage



Threshold Voltage Variance vs. Temperature



Normalized Transient Thermal Impedance Curves

