

2N-Channel MOSFET

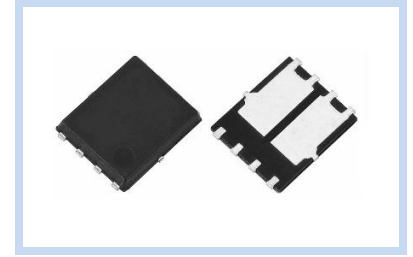
40V 37A 31W DFN5X6 AEC-Q101

MFT42N37D56A

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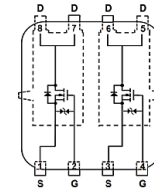
FEATURE

- $R_{DS(ON)} < 12.3m\Omega$, $V_{GS}=10V$, $I_D=10A$
- $R_{DS(ON)} < 15.7m\Omega$, $V_{GS}=4.5V$, $I_D=6A$
- ESD Protected Gate
- AEC-Q101 Qualified



MECHANICAL DATA

- Case: Molded Plastic, DFN5060 Package
- Terminal: Solderable per MIL-STD-750, Method 2026

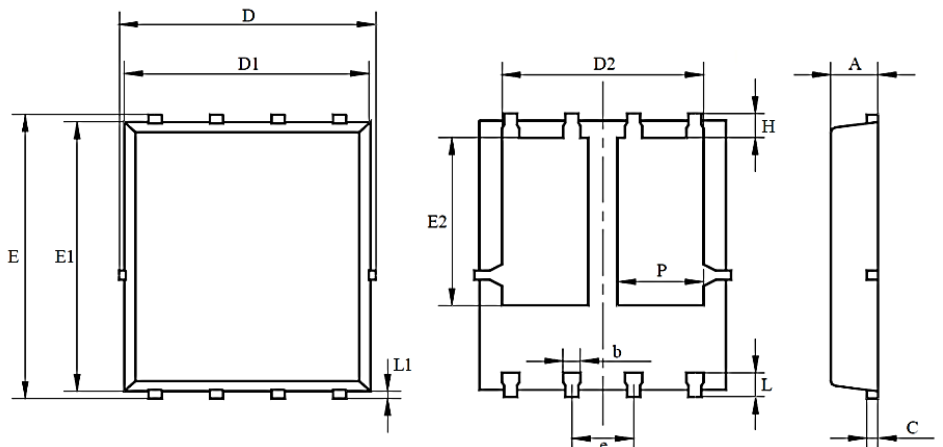


MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current – Continuous	I_D	$T_C=25^\circ C$	37
		$T_C=100^\circ C$	26
Drain Current – Continuous	I_D	$T_A=25^\circ C$	11
		$T_A=70^\circ C$	9
Drain Current – Pulsed	I_{DM}	148	A
Single Pulse Avalanche Energy	E_{AS}	40	mJ
Power Dissipation	P_D	$T_C=25^\circ C$	31
		$T_C=100^\circ C$	15
Power Dissipation	P_D	$T_A=25^\circ C$	2.5
		$T_A=70^\circ C$	1.8
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	60	$^\circ C/W$
Thermal Resistance, Junction to Case	$R_{\theta JC}$	4.9	$^\circ C/W$
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 ~ 175	$^\circ C$

DIMENSIONS

Item	Min. (mm)	Max. (mm)
A	0.85	1.05
b	0.30	0.51
C	0.25	-
D	4.80	5.10
D1	4.80	5.00
D2	4.10	-
E	5.90	6.20
E1	5.70	5.90
E2	3.60	-
e	1.27	-
H	0.41	0.61
L	0.60	-
L1	0.20	-
P	1.70	2.30



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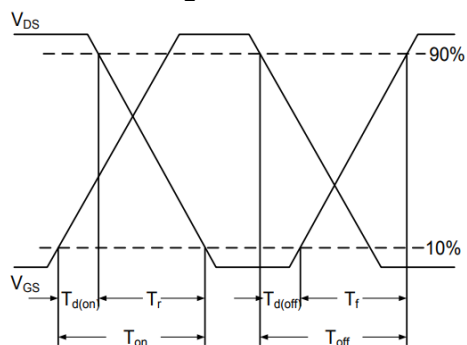
ELECTRICAL CHARACTERISTICS

Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	BV_{DSS}	40	-	-	V
Drain-Source Leakage Current	$V_{DS}=40V, V_{GS}=0V$	I_{bss}	-	-	1	μA
Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	I_{gss}	-	-	± 10	μA
	$V_{GS}=\pm 10V, V_{DS}=0V$		-	-	± 1	μA
On Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Static Drain-Source On-Resistance	$V_{GS}=10V, I_D=10A$	$R_{DS(ON)}$	-	9.8	12.3	m Ω
	$V_{GS}=4.5V, I_D=6A$		-	12.1	15.7	m Ω
Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=50\mu A$	$V_{GS(th)}$	1.1	1.6	2.3	V
Dynamic Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Total Gate Charge	$V_{DS}=32V, V_{GS}=10V, I_D=10A$	Q_g	-	13	-	nC
Gate-Source Charge		Q_{gs}	-	3	-	nC
Gate-Drain Charge		Q_{gd}	-	2	-	nC
Turn-On Delay Time		$T_{d(on)}$	-	7	-	ns
Rise Time	$V_{DD}=32V, V_{GS}=10V, R_G=3\Omega$ $I_D=10A$	T_r	-	78	-	ns
Turn-Off Delay Time		$T_{d(off)}$	-	26	-	ns
Fall Time		T_f	-	56	-	ns
Input Capacitance	$V_{DS}=25V, V_{GS}=0V, f=1MHz$	C_{iss}	-	778	-	pF
Output Capacitance		C_{oss}	-	180	-	pF
Reverse Transfer Capacitance		C_{rss}	-	25	-	pF
Gate Resistance	$f=1MHz$	R_g	-	1.6	-	Ω
Drain-Source Body Diode	Conditions	Symbol	Min	Typ.	Max	Unit
Diode Forward Current-Continuous	$T_C=25^\circ C$	I_S	-	-	37	A
Diode Forward Current-Pulsed		I_{SM}	-	-	148	A
Diode Forward Voltage	$I_S=20A, V_{GS}=0V$	V_{SD}	-	0.9	1.3	V
Reverse Recovery Time	$V_{GS}=0V, I_S=20A,$ $dI_S/dt=100A/\mu s$	T_{rr}	-	20	-	ns
Reverse Recovery Charge		Q_{rr}	-	0.7	1.2	nC

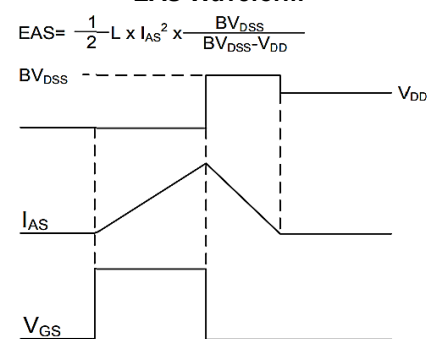
Note:

- Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$
- Essentially Independent of Operating Temperature Typical Characteristics
- Repetitive Rating, Pulse Width Limited by Junction Temperature $T_{J(MAX)}=175^\circ C$.
Rating are based on low frequency and duty cycles to keep initial $T_J=25^\circ C$
- The Maximum Current Rating is Package Limited
- $R_{\theta JA}$ 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 inch² with 2 oz. square pad of copper.
- Test conditions: $L=0.5mH, I_{AS}=13A, V_{GS}=10V, V_{DD}=30V$, starting $T_J=25^\circ C$
- Guaranteed by design, not subject to production testing

Switching Time Waveform

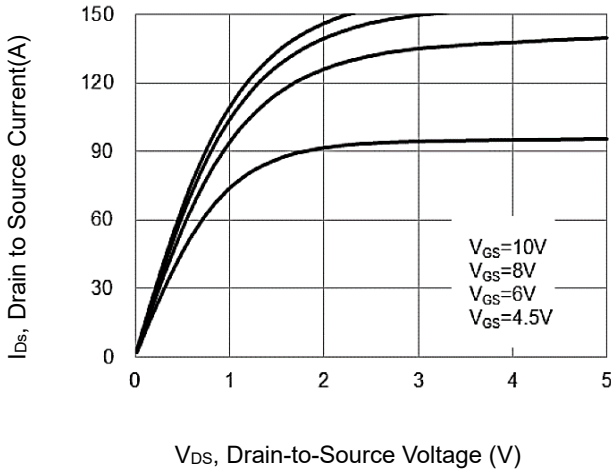


EAS Waveform

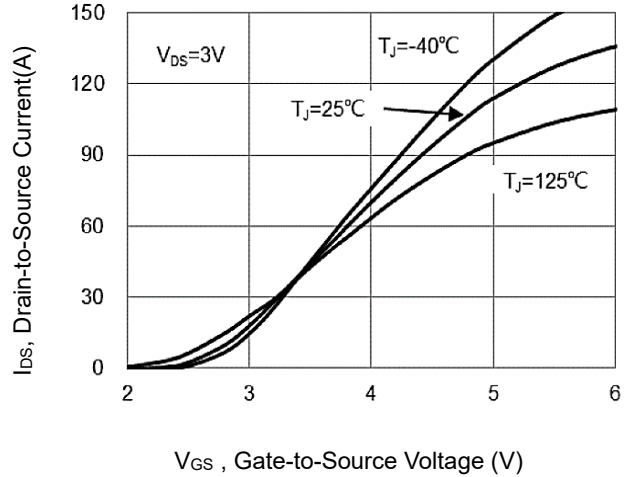


CHARACTERISTICS CURVES

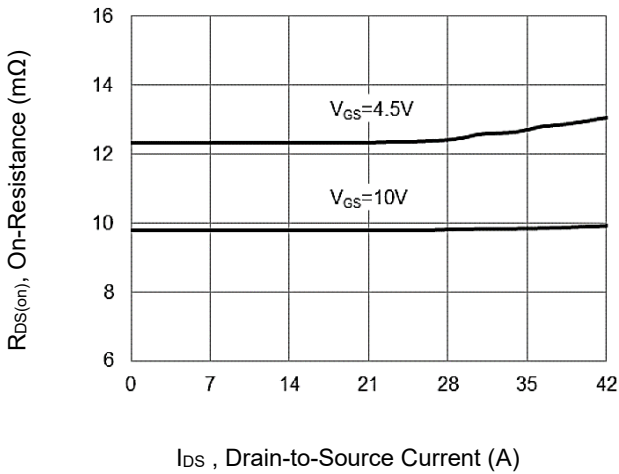
Output Characteristics



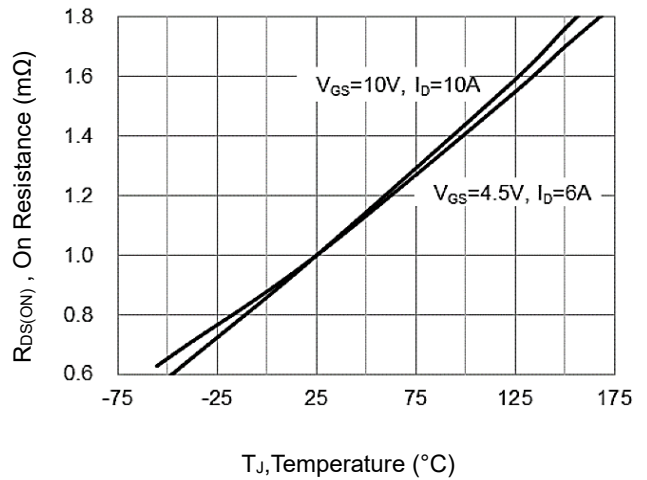
Transfer Characteristics



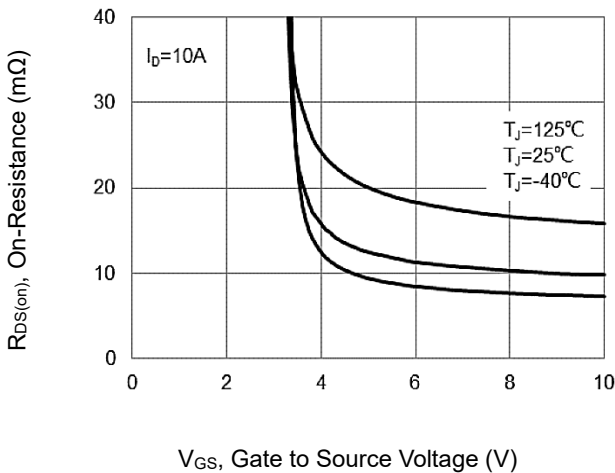
$R_{DS(ON)}$ vs Drain Current



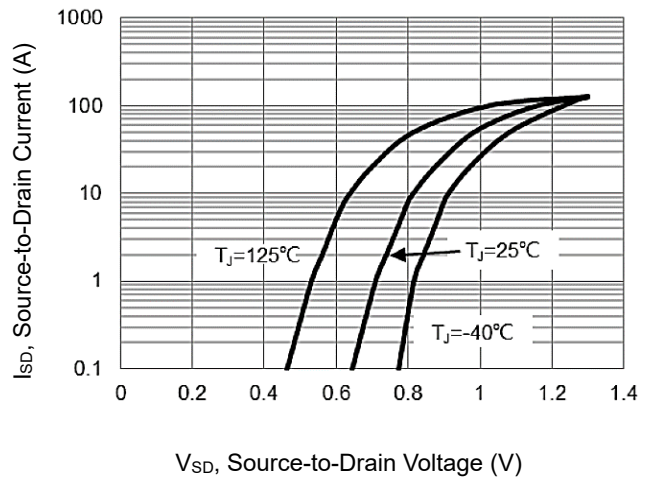
On-Resistance vs Junction Temperature



$R_{DS(ON)}$ vs Gate-Source Voltage



Source-Drain Diode Forward Voltage



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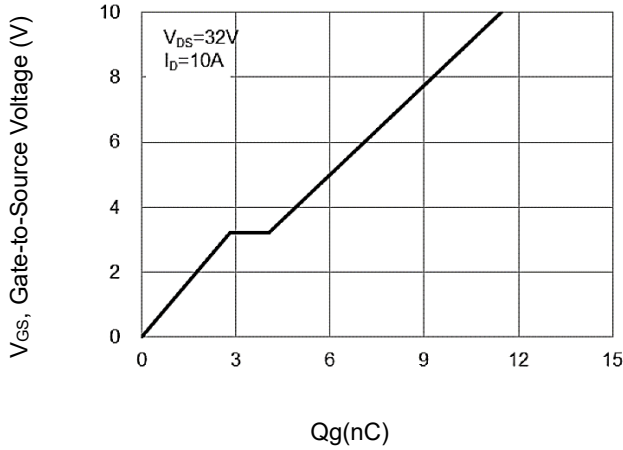
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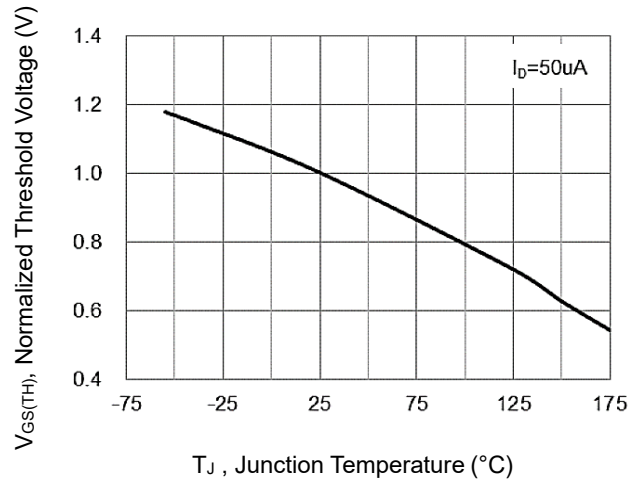
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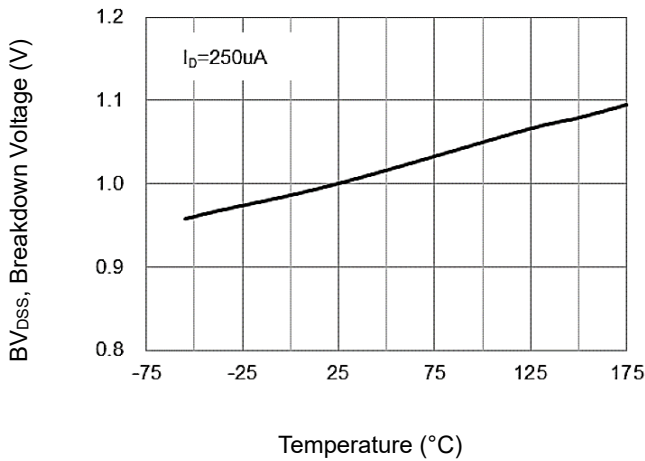
Gate-Charge Characteristics



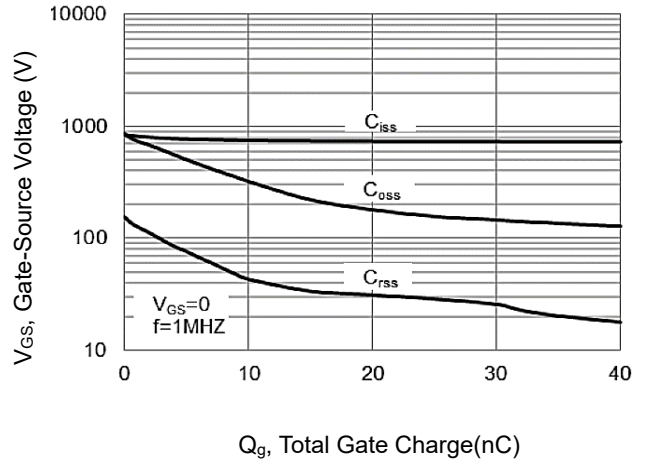
Threshold Voltage vs Junction Temperature



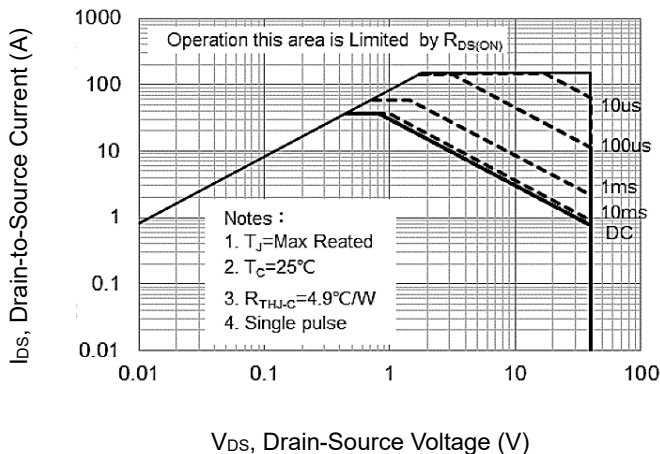
Breakdown Voltage Variation vs Temperature



Capacitance vs Drain-Source Voltage



Maximum Safe Operating Area



Transient Thermal Response Curves

