

N-Channel MOSFET

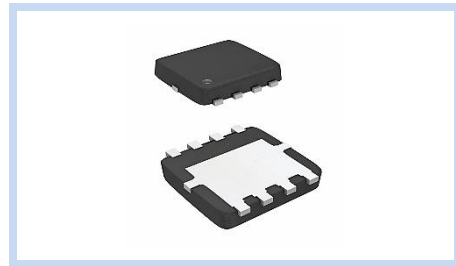
40V 50A DFN3x3-8L AEC-Q101

MFT4N50D33A

MERITEK

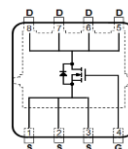
FEATURE

- $R_{DS(ON)} < 7m\Omega$ at $V_{GS}=10V$
- $R_{DS(ON)} < 12m\Omega$ at $V_{GS}=4.5V$
- Application: DC/DC Converter, High-Frequency Switching and Synchronous Rectification
- AEC-Q101 Compliant



MECHANICAL DATA

- Case: DFN3x3-8L package
- Terminal: Solderable per MIL-STD-750, Method 2026

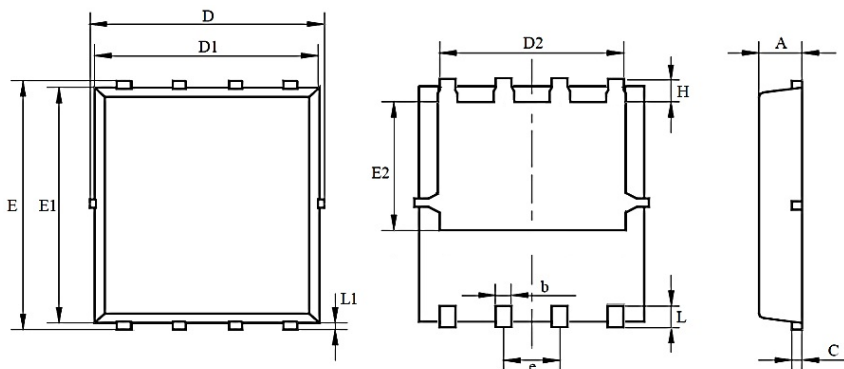


MAXIMUM RATINGS

Parameter, $T_A=25^\circ\text{C}$		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	± 20	V
Drain Current – Continuous	$T_C=25^\circ\text{C}$	I_D	50	A
	$T_C=100^\circ\text{C}$		35	
Drain Current – Pulsed		I_{DM}	200	A
Power Dissipation	$T_C=25^\circ\text{C}$	P_D	35.7	W
Single Pulse Avalanche Current		I_{AS}	25.5	A
Single Pulse Avalanche Energy		E_{AS}	32.5	mJ
Typical Thermal Resistance	Junction to Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$
	Junction to Case	$R_{\theta JC}$	4.2	
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55~175	$^\circ\text{C}$

DIMENSIONS

Item	Min. (mm)	Max. (mm)
A	0.70	0.90
b	0.24	0.35
c	0.10	0.25
D	3.00	3.20
D1	3.00	3.10
D2	2.40	2.60
E	3.10	3.30
E1	2.90	3.10
E2	1.65	1.85
e	0.60	0.70
L	0.30	0.50
H	0.33	0.53



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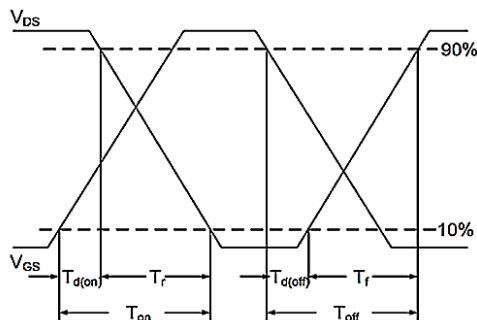
ELECTRICAL CHARACTERISTICS

Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	BV_{DSS}	40	--	--	V
Zero Gate Voltage Drain Current	$V_{DS}=40V, V_{GS}=0V$	I_{DSS}	--	--	1	μA
Gate-Source 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	$V_{GS}=10V, I_D=30A$	$R_{DS(ON)}$	--	5.5	7.0	m Ω
	$V_{GS}=4.5V, I_D=20A$		--	--	12.0	
Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	$V_{GS(th)}$	1.1	--	2.4	V
Forward Transconductance	$V_{DS}=5V, I_D=20A$	g_{FS}	--	31	--	S
Dynamic Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Total Gate Charge	$V_{DS}=20V, V_{GS}=4.5V, I_D=30A$	Q_g	--	22.5	--	nC
	$V_{DS}=20V, V_{GS}=10V, I_D=30A$		--	48.0	--	
Gate-Source Charge	$V_{DS}=20V, V_{GS}=10V, I_D=30A$	Q_{gs}	--	9.0	--	
Gate-Drain Charge		Q_{gd}	--	10.0	--	
Turn-On Delay Time	$V_{DS}=20V, I_D=30A$ $V_{GS}=10V, R_G=3.3\Omega$	$T_{d(on)}$	--	17	--	ns
Rise Time		T_r	--	64	--	
Turn-Off Delay Time		$T_{d(off)}$	--	21	--	
Fall Time		T_f	--	3	--	
Input Capacitance	$V_{DS}=20V, V_{GS}=0V, f=1MHz$	C_{iss}	--	2280	--	pF
Output Capacitance		C_{oss}	--	173	--	
Reverse Transfer Capacitance		C_{rss}	--	119	--	
Gate Resistance	$V_{DS}=0, V_{GS}=0, f=1MHz$	R_g	--	2	--	Ω
Drain-Source Body Diode	Conditions	Symbol	Min	Typ.	Max	Unit
Continuous Source Current	--	I_S	--	--	50	A
Pulse Source Current	--	I_{SM}	--	--	200	A
Diode Forward Voltage	$V_{GS}=0V, I_S=1A$	V_{SD}	--	--	1.2	V
Reverse Recovery Time	$I_F=30A, dI/dt=100A/\mu s$	t_{rr}	--	13	--	ns
Reverse Recovery Charge		Q_{rr}	--	8	--	nC

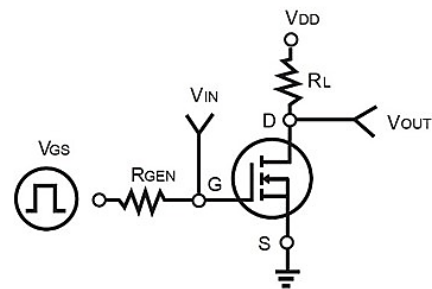
Note:

1. Pulse width<100 μs , Duty cycle<2%. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=175^\circ C$
2. Limited by $T_{J(MAX)}=175^\circ C$, starting $T_J=25^\circ C$, $L=0.1mH$, $R_g=25\Omega$, $I_{AS}=25.5A$, $V_{GS}=10V$.
3. Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate in still air.

Switching Time Waveform

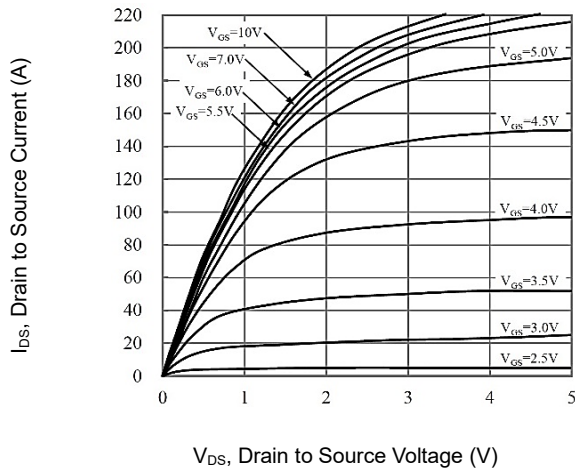


Switching Test Circuit

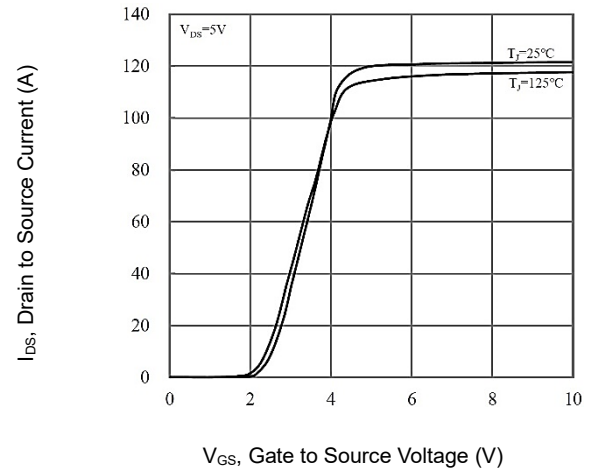


CHARACTERISTIC CURVES

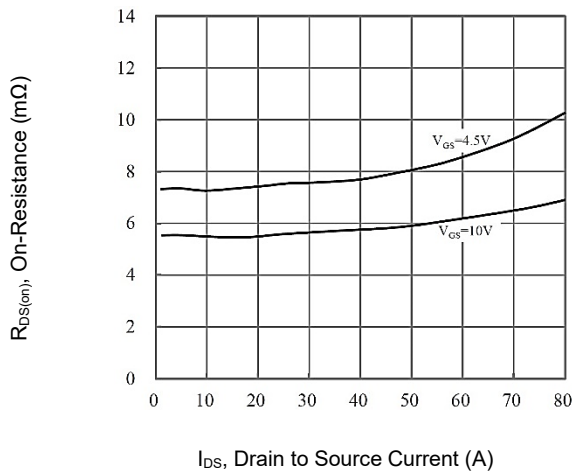
On-Region Characteristic



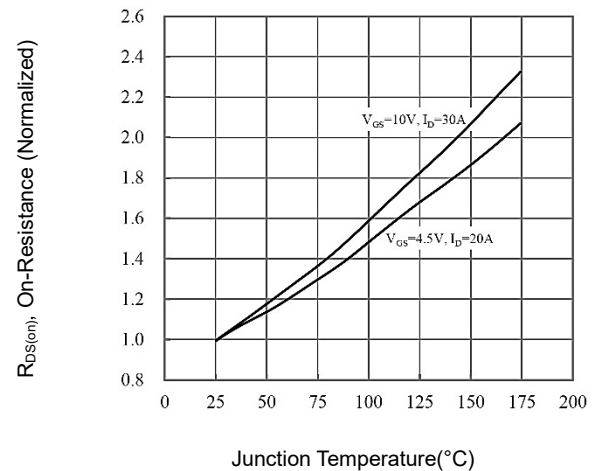
Transfer Characteristics



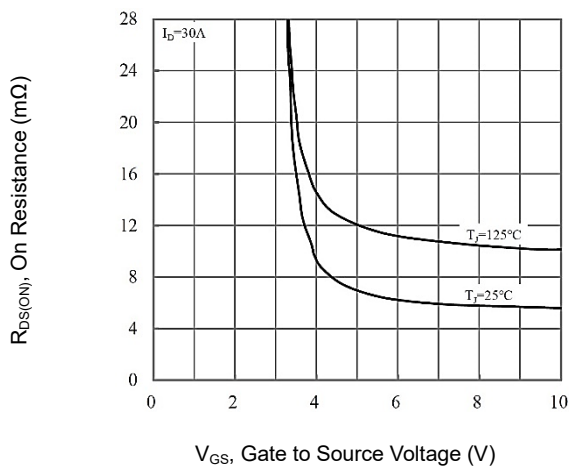
On-Resistance vs. Drain Current



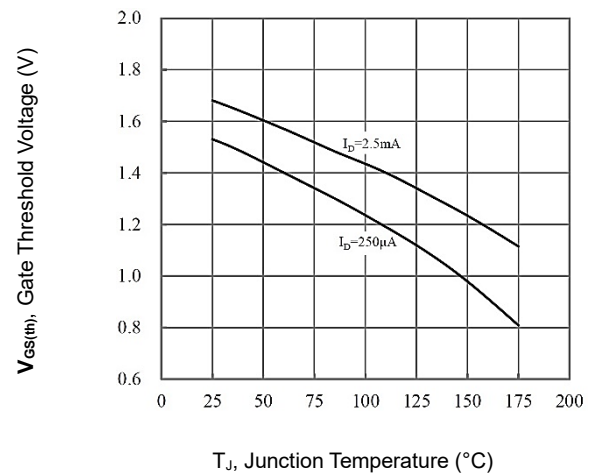
On-Resistance vs. Junction Temperature



On-Resistance Variation with VGS

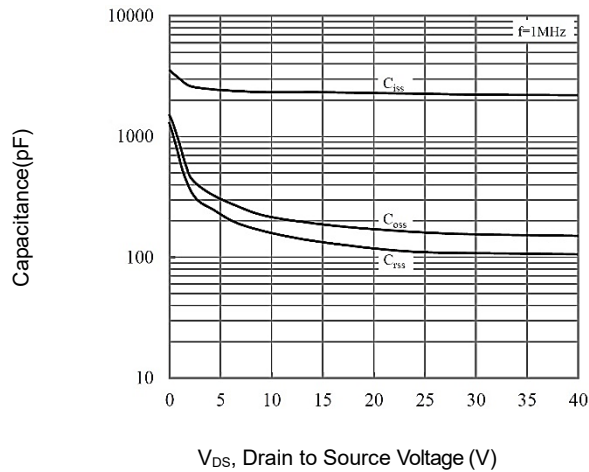


Gate Threshold Voltage vs. Temperature

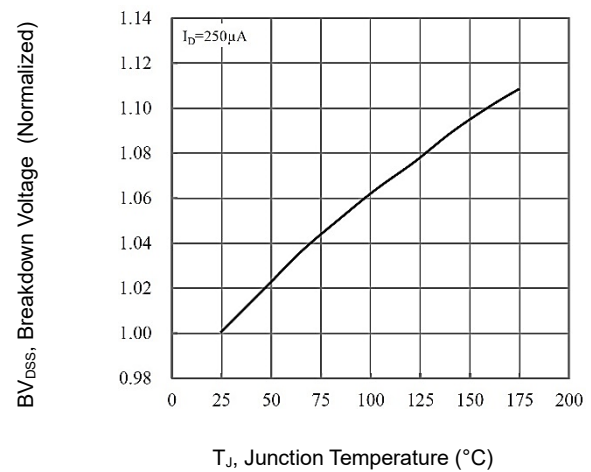


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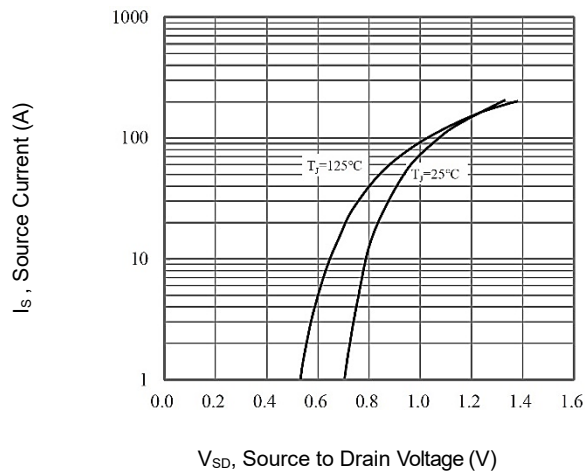
Capacitance vs. Drain-Source Voltage



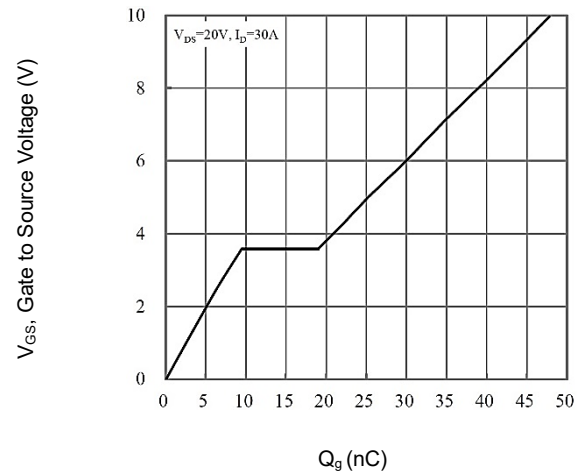
Breakdown Voltage vs Temperature



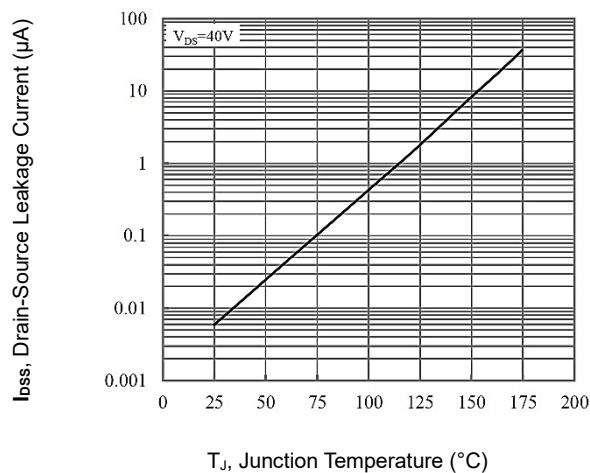
Source-Drain Diode Forward Voltage



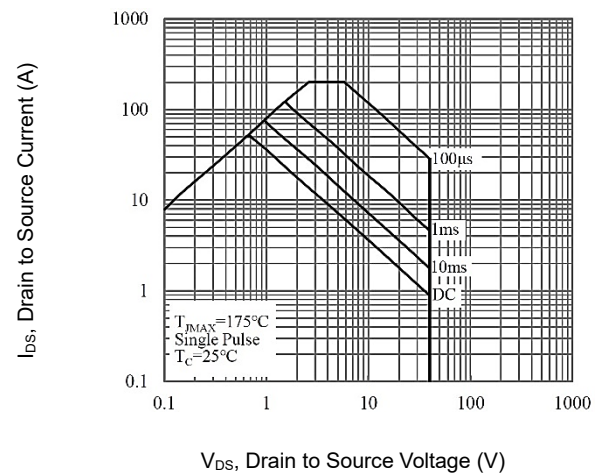
Gate-Charge Characteristics



Drain-Source Leakage Current

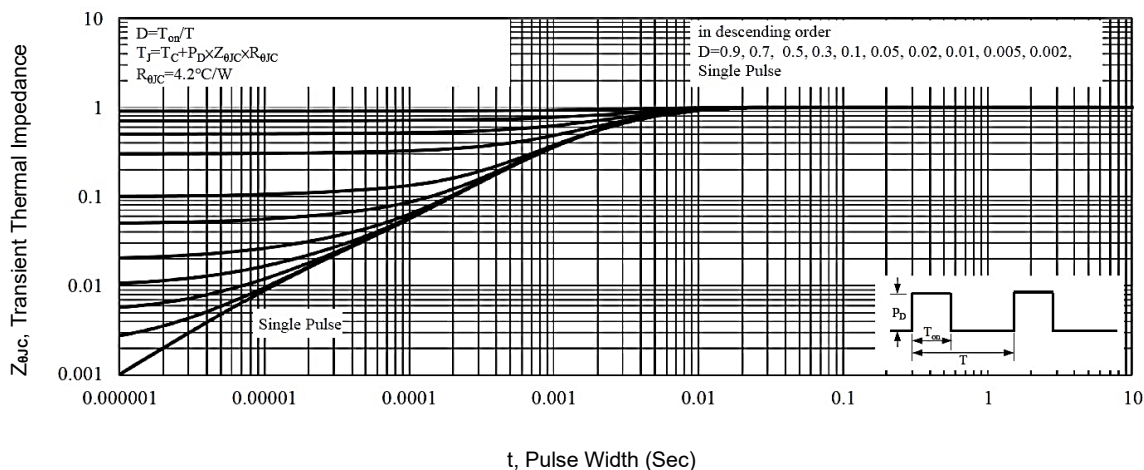


Maximum Safe Operating Area



CHARACTERISTIC CURVES

Normalized Transient Thermal Impedance, Junction to Case



Normalized Transient Thermal Impedance, Junction to Ambient

