

N-Channel MOSFET

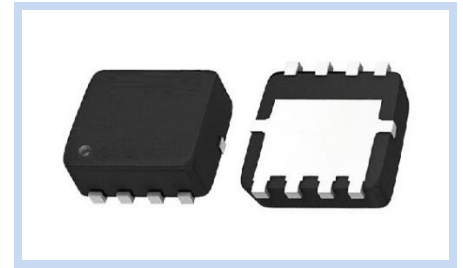
40V 52A DFN3×3-8L

MFT4N52D33

MERITEK

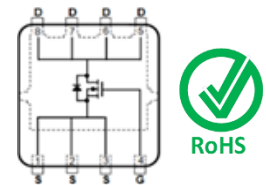
FEATURE

- $R_{DS(ON)} < 5.7m\Omega$ at $V_{GS}=10V$
- $R_{DS(ON)} < 7m\Omega$ at $V_{GS}=4.5V$
- Extremely Low $R_{DS(ON)}$
- Application: DC/DC Conversion, Motor Drive Control, Synchronous Rectification



MECHANICAL DATA

- Case: DFN3×3-8L Package
- Terminals: Solderable per MIL-STD-750, Method 2026

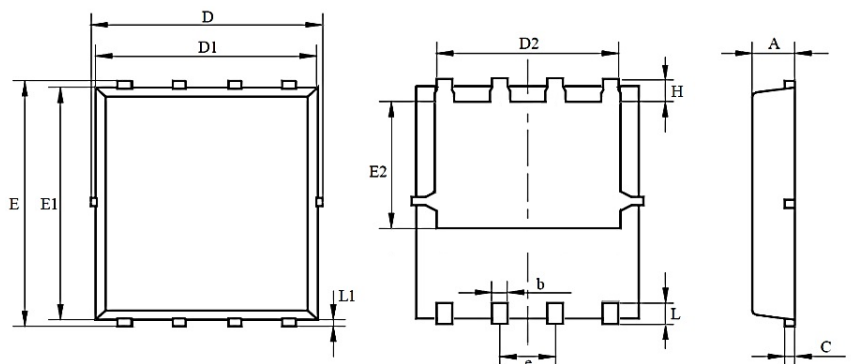


MAXIMUM RATINGS

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	± 20	V
Drain Current – Continuous	at $T_J = 25^\circ C$	I_D	52	A
	at $T_J = 100^\circ C$		32	
Drain Current – Pulsed		I_{DM}	220	A
Single Pulse Avalanche Current		I_{AS}	20.3	A
Single Pulse Avalanche Energy		E_{AS}	103	mJ
Power Dissipation	at $T_J = 25^\circ C$	P_D	30	W
Thermal Resistance Junction to Case		$R_{\theta JC}$	5	$^\circ C/W$
Thermal Resistance Junction to Ambient		$R_{\theta JA}$	58	$^\circ C/W$
Operating Junction and Storage Temperature		T_J, T_{STG}	-55 to +175	$^\circ C$

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	2.90	3.20
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
L1	0.05	0.10
H	0.20	0.40



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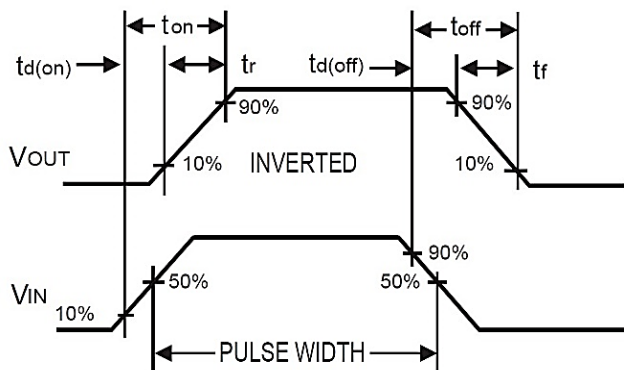
ELECTRICAL CHARACTERISTICS

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	$V_{DS}=32V$, $V_{GS}=0V$	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	$V_{GS}=10V$, $I_D=10A$	$R_{DS(ON)}$	--	4.6	5.7	m Ω
	$V_{GS}=4.5V$, $I_D=5A$		--	--	7.0	
Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	$V_{GS(th)}$	1.0	--	2.5	V
Forward Transconductance	$V_{DS}=5V$, $I_D=5A$	g_{FS}	--	18.8	--	S
Dynamic Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Total Gate Charge	$V_{DS}=20V$, $V_{GS}=4.5V$, $I_D=10A$	Q_g	--	33.0	--	nC
Gate-Source Charge			--	69.9	--	
Gate-Drain Charge		Q_{gd}	--	10.0	--	
Turn-On Delay Time	$V_{DS}=20V$, $V_{GS}=10V$, $R_G=3.3\Omega$, $I_D=10A$	$T_{d(on)}$	--	22	--	nS
Rise Time		T_r	--	26	--	
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}	--	3225	--	pF
Output Capacitance		C_{oss}	--	260	--	
Reverse Transfer Capacitance		C_{rss}	--	195	--	
Gate Resistance	$V_{DS}=0V$, $V_{GS}=0V$, $F=1MHz$	R_g	--	0.5	--	Ω
Drain-Source Body Diode	Conditions	Symbol	Min	Typ.	Max	Unit
Diode Forward Current	--	I_S	--	--	52	A
Pulse Diode Forward Current		I_{SM}	--	--	220	
Diode Forward Voltage	$V_{GS}=0V$, $I_S=1A$	V_{SD}	--	--	1.2	V
Reverse Recovery Time	$I_S=10A$, $dI_S/dt=100A/\mu s$	T_{rr}	--	16	--	ns
Reverse Recovery Charge		Q_{rr}	--	9	--	nC

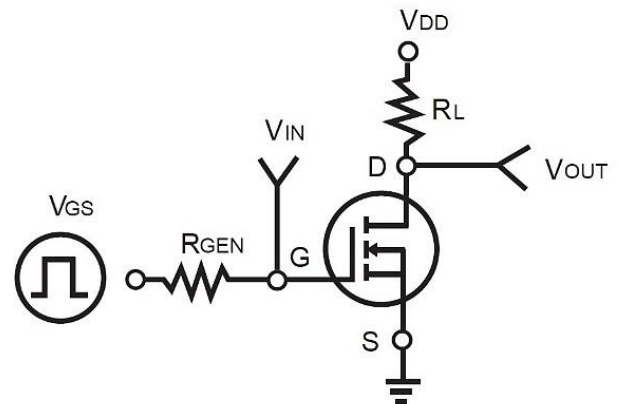
Note:

1. Pulse width $\leq 100\mu s$, duty cycle $\leq 2\%$, Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}=175^\circ C$.
2. Device mounted on FR-4 substrate PC board, 2oz copper, with 1 inch² copper plate in still air.
3. The test condition is $L=0.5mH$, $I_{AS}=20.3A$, $R_G=25\Omega$, $V_{GS}=10V$, Starting $T_J=25^\circ C$.

Switching Time Waveform

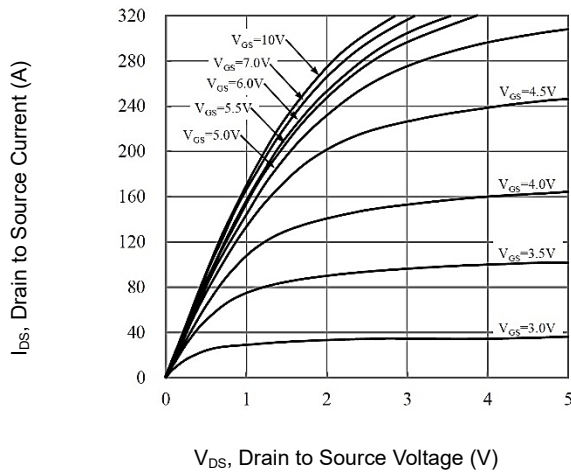


Switching Test Circuit

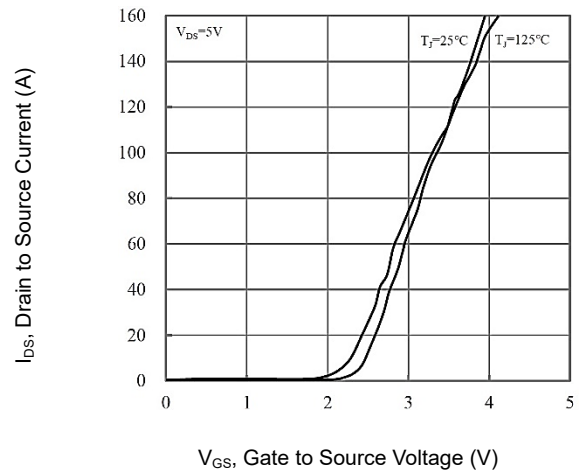


CHARACTERISTIC CURVES

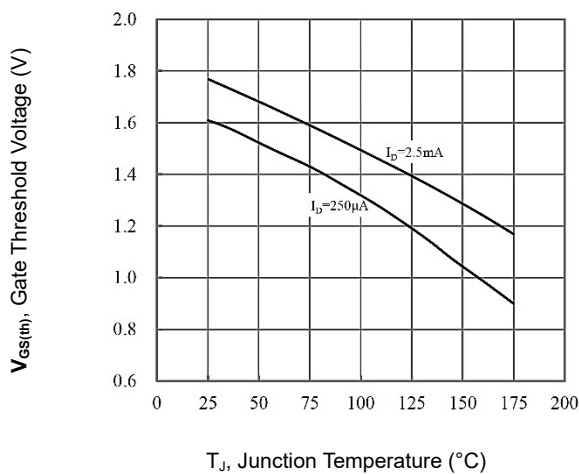
On-Region Characteristics



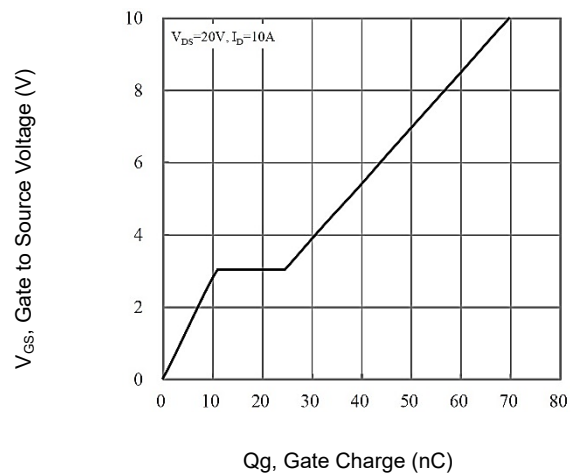
Transfer Characteristics



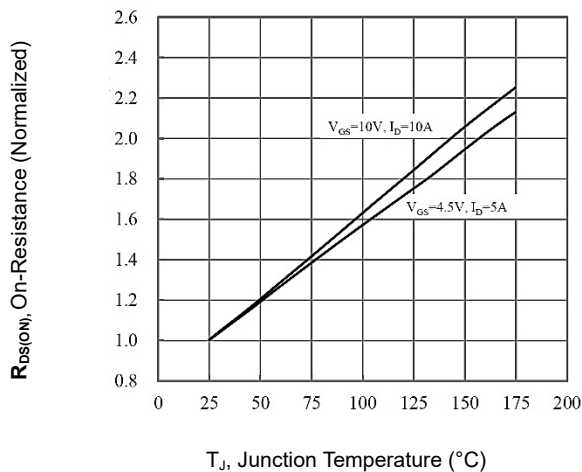
Gate Threshold Voltage vs. Temperature



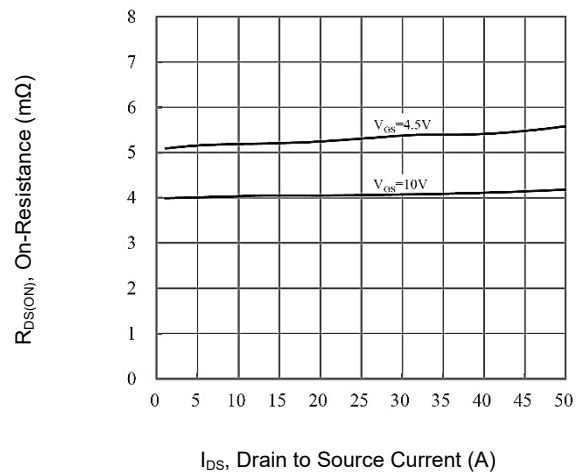
Gate Charge Waveform



Normalized On-Resistance vs. Temperature

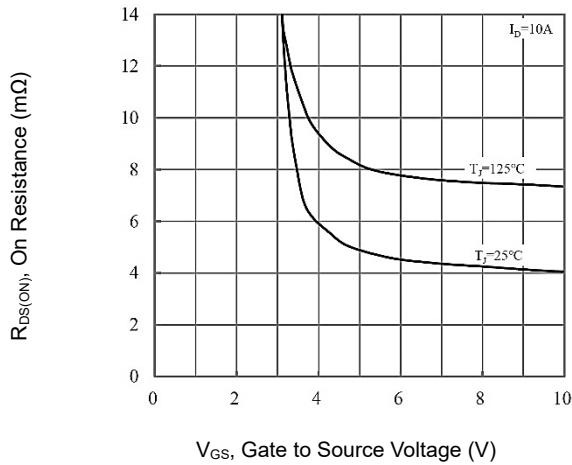


On-Resistance vs. Drain Current

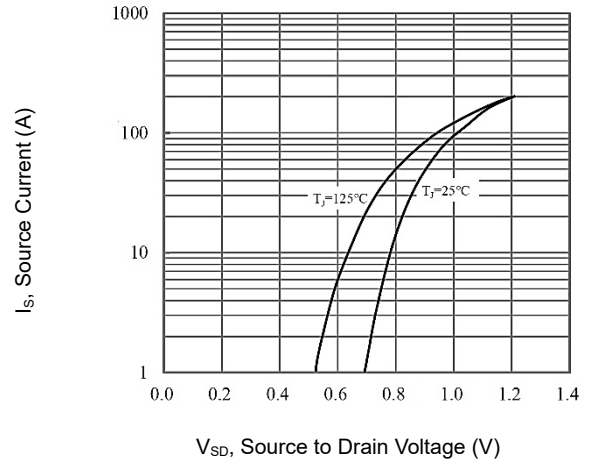


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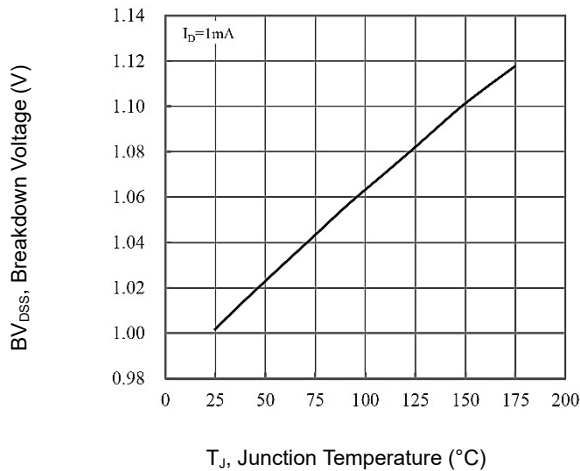
On-Resistance Variation with V_{GS}



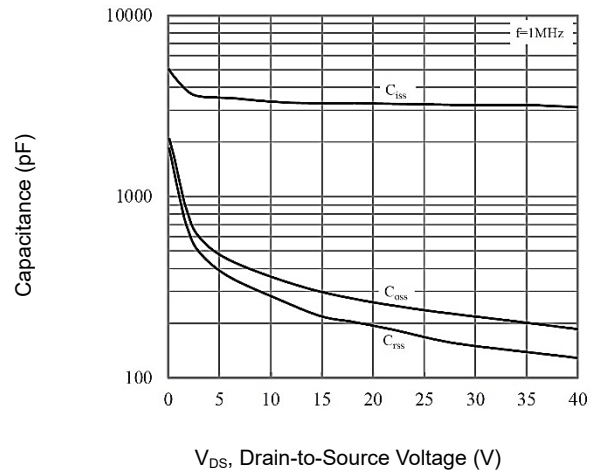
Body Diode Forward Voltage



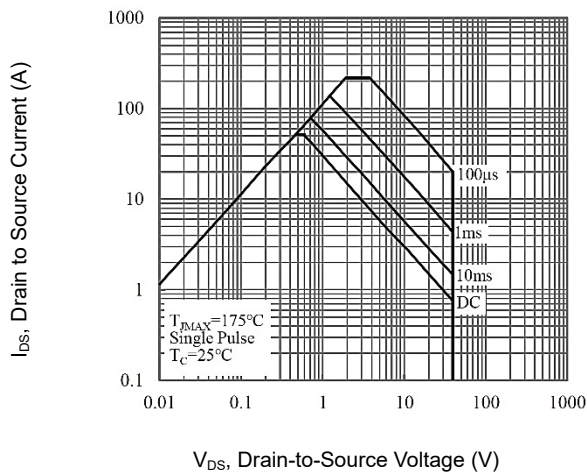
Breakdown Voltage vs Temperature



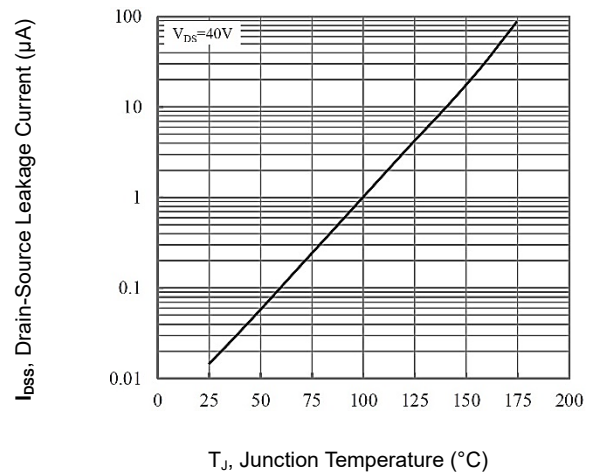
Capacitance vs. Drain-Source Voltage



Maximum Safe Operating Area

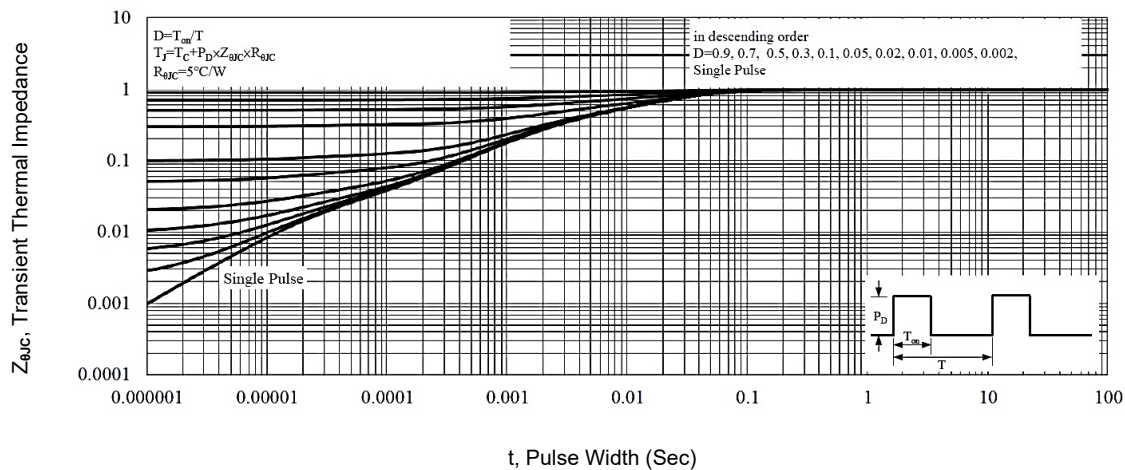


Drain-Source Leakage Current



CHARACTERISTIC CURVES

Normalized Transient Thermal Impedance, Junction to Case



Normalized Transient Thermal Impedance, Junction to Ambient

