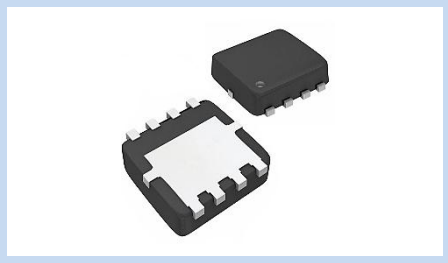
P-Channel MOSFET
40V 39A DFN3x3

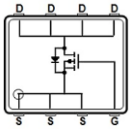
MFT4P39D33

MERITEK

FEATURE

- $R_{DS(ON)}$<13mΩ, V_{GS}=-10V, I_D=-10A
- $R_{DS(ON)}$<18mΩ, V_{GS}=-4.5V, I_D=-8A
- High Density Cell Design for Low $R_{DS(ON)}$
- Application: DC/DC Converter, High-Frequency Switching and Synchronous Rectification





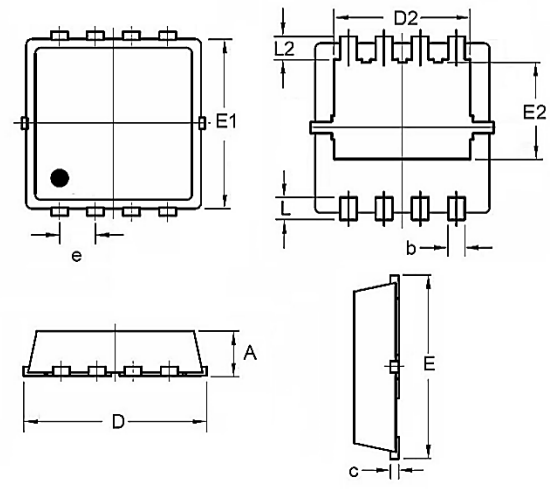
RoHS

MAXIMUM RATINGS

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	-40	V
Gate-Source Voltage		V_{GS}	±20	V
Drain Current – Continuous	T_C= 25°C	I_D	-39	A
	T_C= 100°C		-27	
Drain Current – Pulsed		I_{DM}	-160	A
Power Dissipation	T_C= 25°C	P_D	31.2	W
Avalanche Current		I_{AS}	-32	A
Avalanche Energy		E_{AS}	51	mJ
Thermal Resistance Junction to Case		$R_{\theta JC}$	4.8	°C/W
Thermal Resistance Junction to Ambient		$R_{\theta JA}$	55	°C/W
Operating Junction and Storage Temperature		T_J, T_{STG}	-55 to +175	°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
D2	2.40	2.60
e	0.60	0.70
E	3.10	3.30
E1	2.90	3.10
E2	1.65	1.85
L	0.30	0.50
L2	0.20	0.40

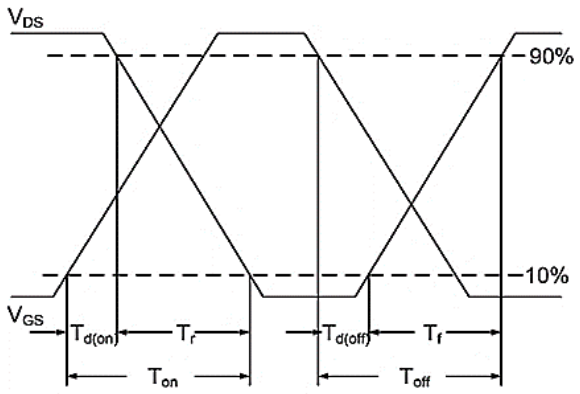


ELECTRICAL CHARACTERISTICS

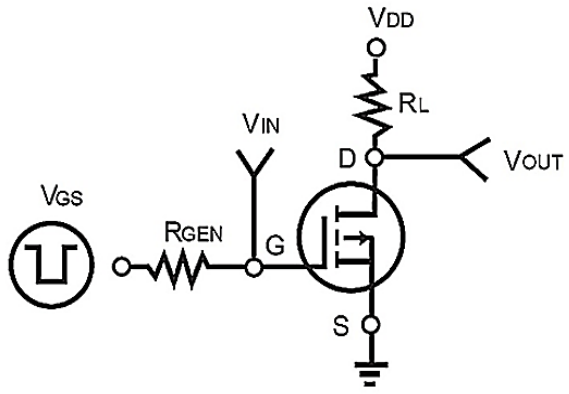
Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	I_D=-250μA	BV_{DSS}	-40	--	--	V
Zero Gate Voltage Drain Current	V_{DS}=-32V	I_{DSS}	--	--	-1	μA
Gate Leakage Current	V_{GS}=±20V	I_{GSS}	--	--	±100	nA
On Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Static Drain-Source On-Resistance	V_{GS}=-10V, I_D=-10A	$R_{DS(ON)}$	--	11	13	mΩ
	V_{GS}=-4.5V, I_D=-8A		--	--	18	
Gate Threshold Voltage	V_{GS}=V_{DS}, I_D=-250μA	$V_{GS(th)}$	-1.0	--	-2.5	V
Forward Transconductance	V_{DS}=-5V, I_D=-10A	gfs	--	29.4	--	S
Dynamic Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Total Gate Charge	V_{DS}=-20V, V_{GS}=-4.5V, I_D=-10A	Q_g	--	28	--	nC
	V_{DS}=-20V, V_{GS}=-10V, I_D=-10A		--	59	--	
Gate-Source Charge		Q_{gs}	--	10	--	
Gate-Drain Charge		Q_{gd}	--	9	--	
Turn-On Delay Time	V_{DD}=-20V, V_{GS}=-10V, R_{GEN}=3.3Ω, I_D=-10A	$T_{d(on)}$	--	19	--	nS
Rise Time		T_r	--	25	--	
Turn-Off Delay Time		$T_{d(off)}$	--	26	--	
Fall Time		T_f	--	4	--	
Input Capacitance	V_{DS}=-20V, V_{GS}=0V, f=1MHz	C_{iss}	--	3538	--	pF
Output Capacitance		C_{oss}	--	265	--	
Reverse Transfer Capacitance		C_{rss}	--	178	--	
Gate Resistance	V_{DS}=0V, V_{GS}=0V, f=1MHz	R_g	--	2.2	--	Ω
Drain-Source Body Diode	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Diode Continuous Forward Current	--	I_S	--	--	-39	A
Diode Pulse Current		I_{SM}	--	--	-160	A
Diode Forward Voltage	V_{GS}=0V, I_S=-1A	V_{SD}	--	--	-1.3	V
Reverse Recovery Time	I_S=-10A, di/dt=100A/μs	t_{rr}	--	16.5	--	nS
Reverse Recovery Charge		Q_{rr}	--	10.3	--	nC

Note:
1. Pulse width≤100μs, duty cycle≤2%, Repetitive rating, pulsed width limited by maximum junction temperature $T_{J(MAX)}$=175°C.
2. EAS condition: Limited by $T_{J(MAX)}$, Starting T_J=25°C, V_{GS}=-10V, L=0.1mH, I_{AS}=-32A, R_G=25Ω
3. $R_{\Theta JA}$: Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch^2 copper plate in still air.

Switching Time Waveform

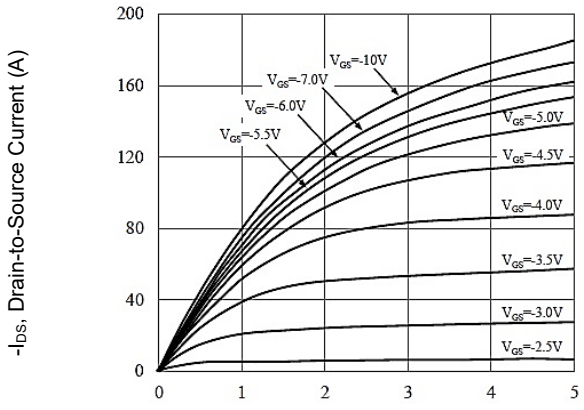


Switching Test Circuit



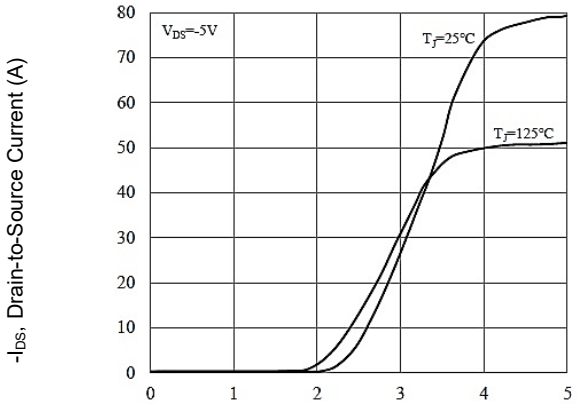
CHARACTERISTIC CURVES

Output Characteristics



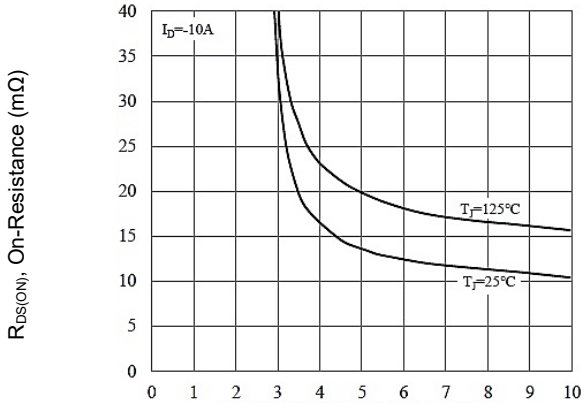
-V_{DS}, Drain-to-Source Voltage (V)

Transfer Characteristics



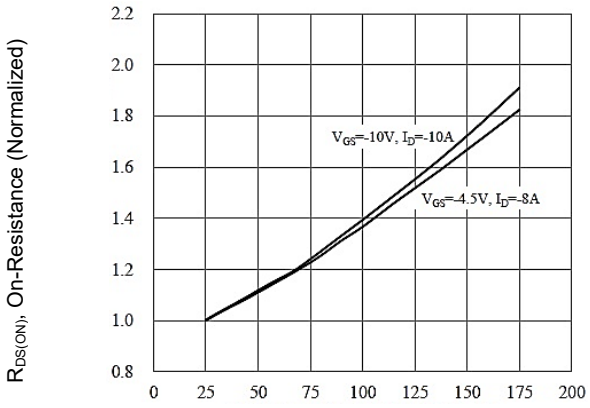
-V_{GS}, Gate-to-Source Voltage (V)

On-Resistance vs. Gate-to-Source Voltage



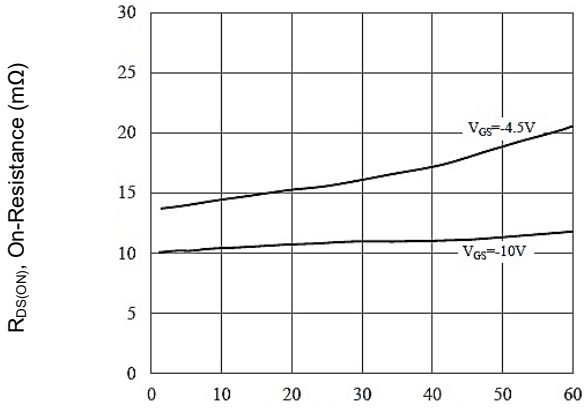
-V_{GS}, Gate-to-Source Voltage (V)

On-Resistance vs. Junction Temperature



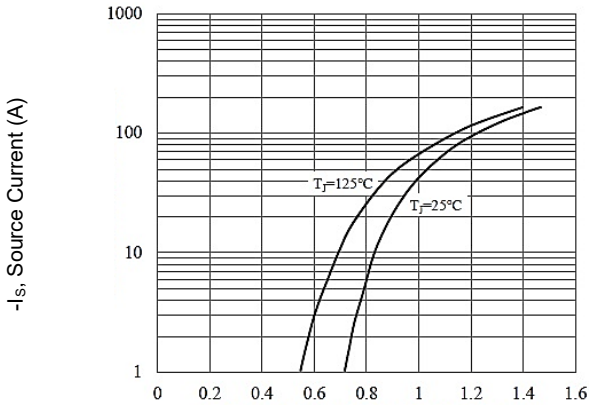
T_J, Junction Temperature (°C)

On-Resistance vs. Drain Current



-I_{DS}, Drain-to-Source Current (A)

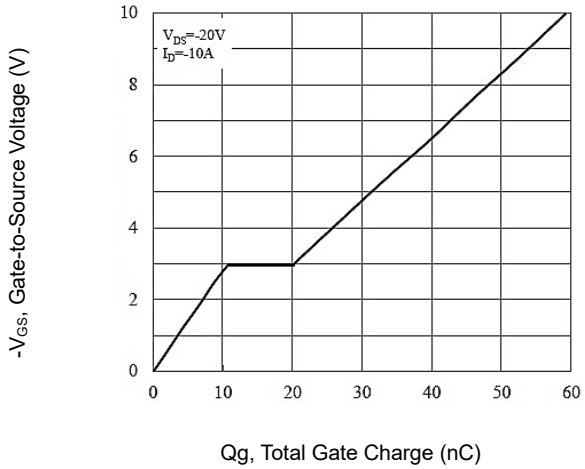
Body Diode Characteristics



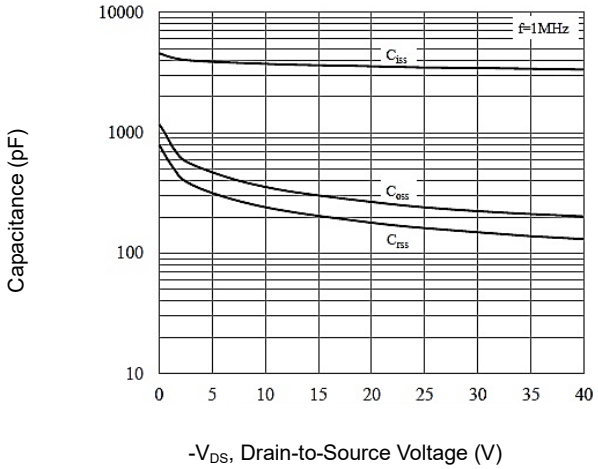
-V_{SD}, Source-to-Drain Voltage (V)

CHARACTERISTIC CURVES

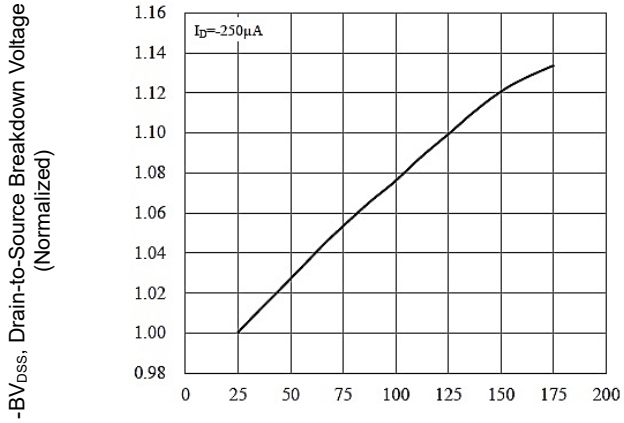
Gate Charge Characteristics



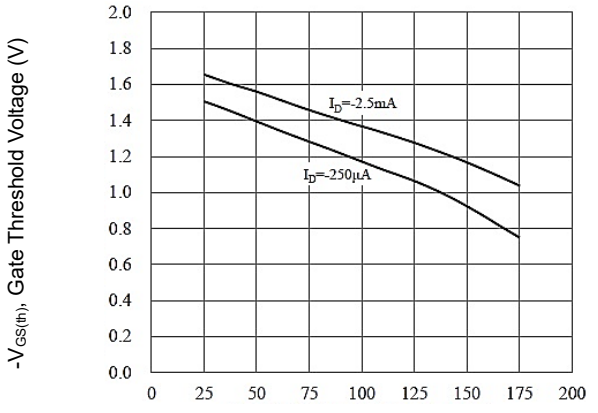
Capacitance



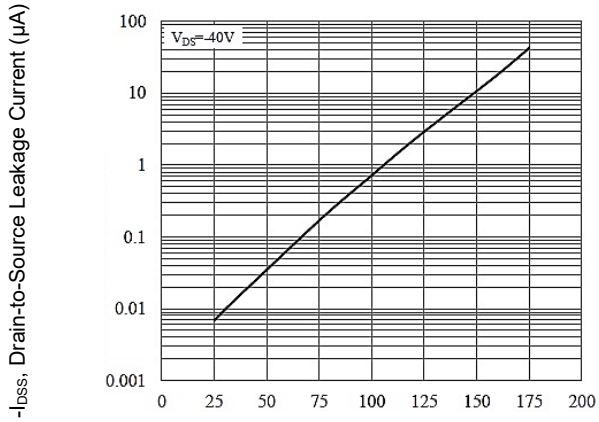
Breakdown Voltage vs. Temperature



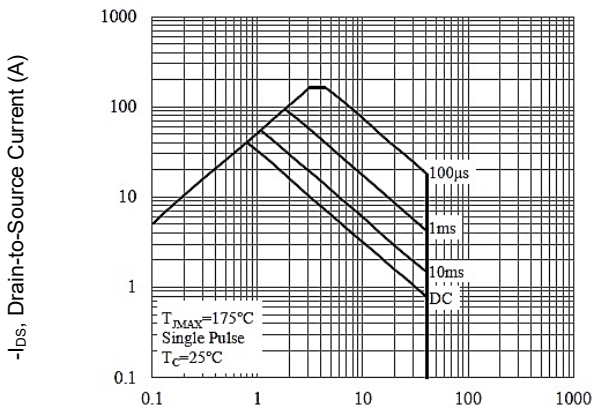
Threshold Voltage vs. Temperature



Drain-Source Leakage Current vs. Temperature

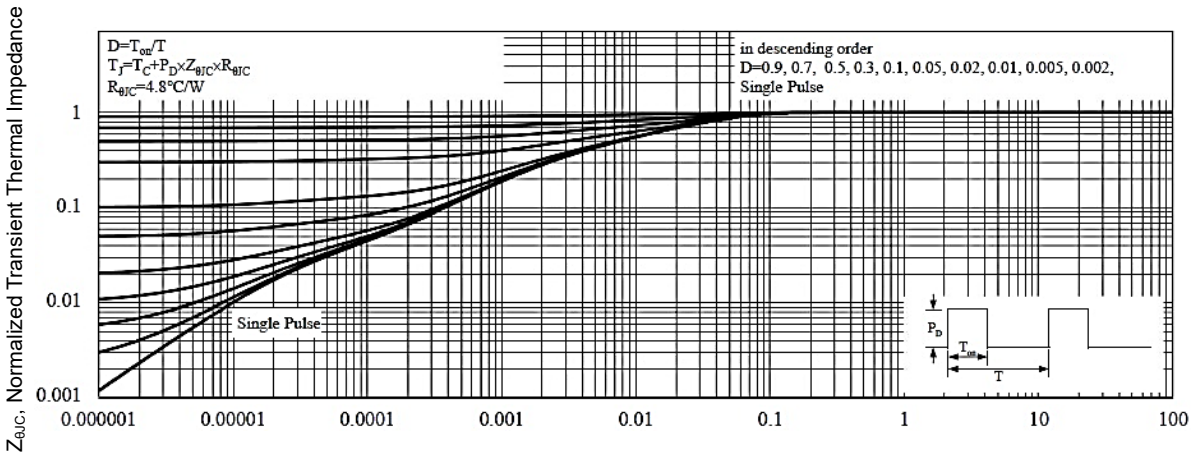


Maximum Safe Operating Area



CHARACTERISTIC CURVES

Maximum Transient Thermal Impedance



Maximum Transient Thermal Impedance