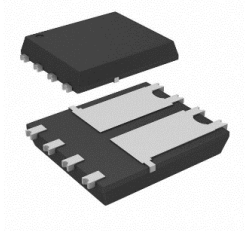
P Channel MOSFET AEC-Q101
40V 50A 63W DFN5×6-8L

MFT4P50D56A

MERITEK

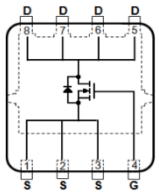
FEATURE

- $R_{DS(ON)}$<12mΩ, V_{GS}=-10V, I_D=-10A
- $R_{DS(ON)}$<17.5mΩ, V_{GS}=-4.5V, I_D=-8A
- Fast Switching Characteristic
- Improved dv/dt capability
- AEC-Q101 qualified



MECHANICAL DATA

- Case: DFN5×6-8L Package
- Terminals: Solderable per MIL-STD-750, Method 2026



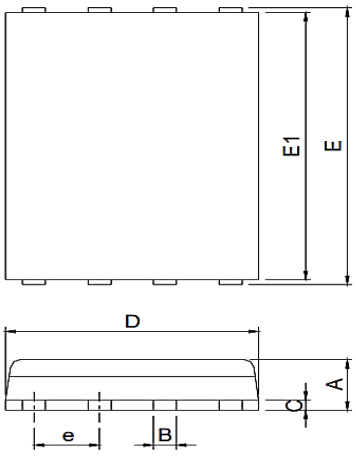
RoHS

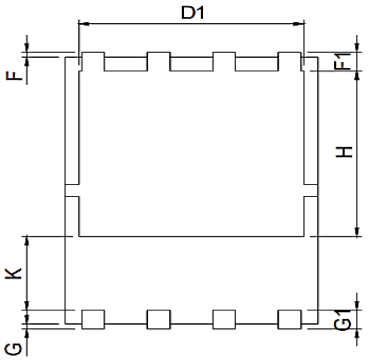
MAXIMUM RATINGS

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	-50	A
	T_C= 100°C		-32	
Drain Current – Pulsed	T_C= 25°C	I_{DM}	-166	A
Power Dissipation	T_C= 25°C	P_D	63	W
	T_C= 100°C		25	
Drain Current – Continuous	T_A= 25°C	I_D	-9	A
	T_A= 70°C		-7	
Power Dissipation	T_A= 25°C	P_D	2	W
	T_A= 70°C		1.3	
Thermal Resistance Junction to Case		$R_{\theta JC}$	2	°C/W
Thermal Resistance Junction to Ambient		$R_{\theta JA}$	62.5	°C/W
Operating Junction and Storage Temperature		T_J, T_{STG}	-55 to +150	°C

DIMENSIONS

Item	Min. (mm)	Max. (mm)
A	0.90	1.10
B	0.33	0.51
C	0.20	0.30
D	4.80	5.00
D1	4.00	4.40
E	5.90	6.10
E1	5.70	5.80
F	0.06	0.20
F1	0.41	0.61
G	0.06	0.20
G1	0.51	0.71
H	3.38	3.78
K	1.10	-



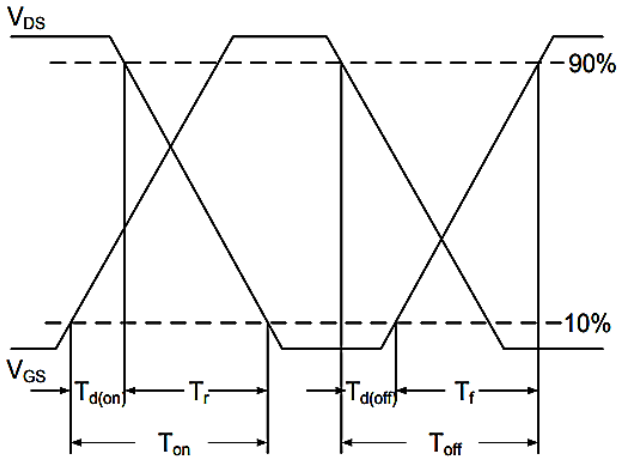


ELECTRICAL CHARACTERISTICS

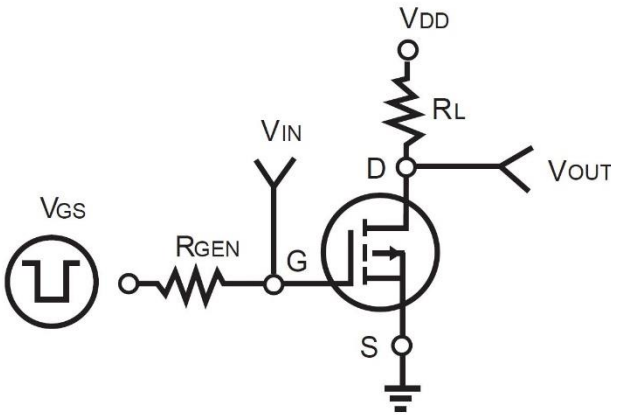
Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250μA	BV_{DSS}	-40	--	--	V
Drain-Source Leakage Current	V_{DS}=-40V, V_{GS}=0V,	I_{DSS}	--	--	-1	μA
Gate-Source Leakage Current	V_{GS}=±20V, V_{DS}=0V	I_{GSS}	--	--	±100	nA
On Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Static Drain-Source On-Resistance	V_{GS}=-10V, I_D=-10A	$R_{DS(ON)}$	--	10	12	mΩ
	V_{GS}=-4.5V, I_D=-8A		--	13.5	17.5	
Gate Threshold Voltage	V_{GS}=V_{DS}, I_D=-250μA	$V_{GS(th)}$	-1.0	-1.52	-2.5	V
Dynamic Characteristics	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Total Gate Charge	V_{DS}=-32V, V_{GS}=-4.5V, I_D=-10A	Q_g	--	23	--	nC
Gate-Source Charge		Q_{gs}	--	8.5	--	
Gate-Drain Charge		Q_{gd}	--	9	--	
Turn-On Delay Time	V_{DS}=-20V, V_{GS}=-10V, R_G=6Ω, I_D=-1A	$T_{d(on)}$	--	23	--	nS
Rise Time		T_r	--	10	--	
Turn-Off Delay Time		$T_{d(off)}$	--	135	--	
Fall Time		T_f	--	50	--	
Input Capacitance	V_{DS}=-25V, V_{GS}=0V, F=1MHz	C_{iss}	--	2767	--	pF
Output Capacitance		C_{oss}	--	247	--	
Reverse Transfer Capacitance		C_{rss}	--	139	--	
Drain-Source Body Diode	**Conditions**	**Symbol**	**Min**	**Typ.**	**Max**	**Unit**
Diode Forward Current	--	I_S	--	--	-50	A
Diode Forward Voltage	V_{GS}=0V , I_S=-1A	V_{SD}	--	-0.7	-1.0	V

Note:
1. Pulse width≤300μs, duty cycle≤2%
2. Essentially independent of operating temperature typical characteristics
3. Guaranteed by design,not test in mass production
4. The maximum current rating is package limited
5. $R_{\theta JA}$ and $R_{\theta Jc}$ are 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 inch^2 with 2oz.square pad of copper.
6. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C. Ratings are based on low frequency and duty cycles to keep initial T_J =25°C.

Switching Time Waveform

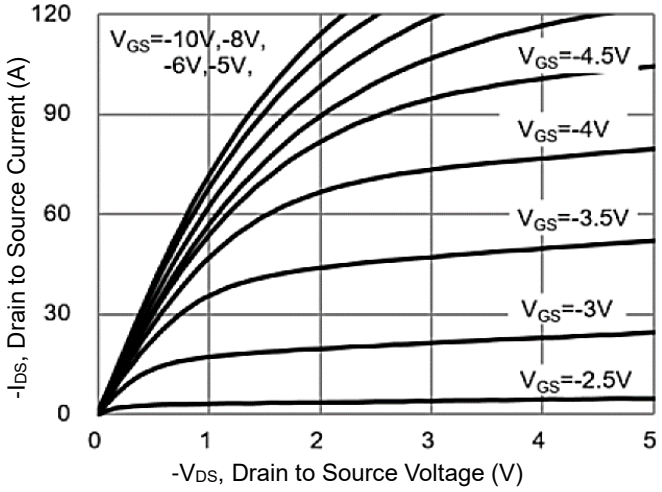


Switching Test Circuit

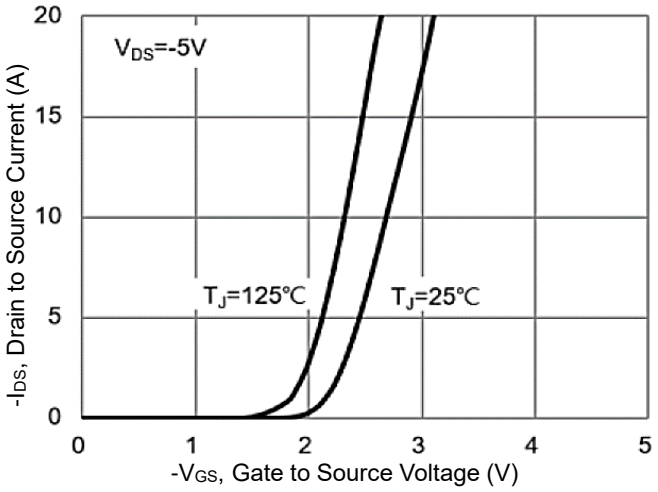


CHARACTERISTIC CURVES

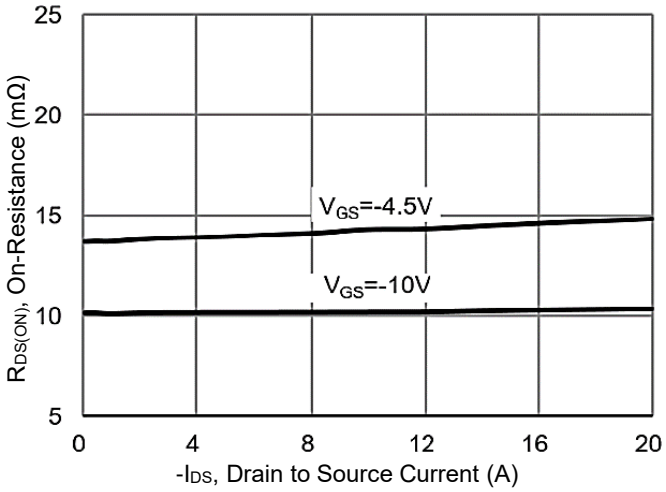
On-Region Characteristics



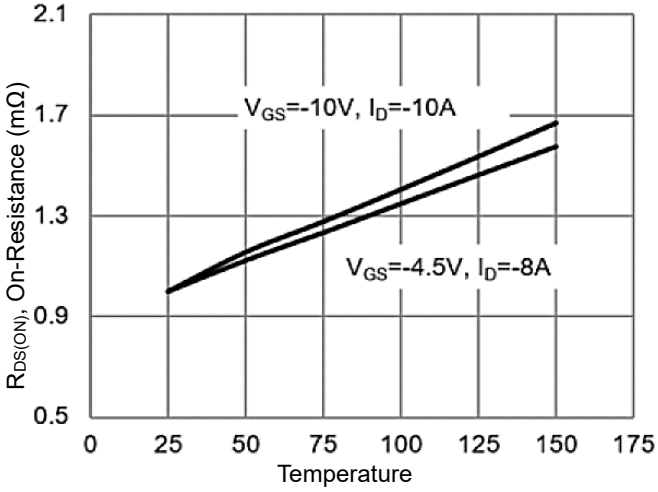
Transfer Characteristics



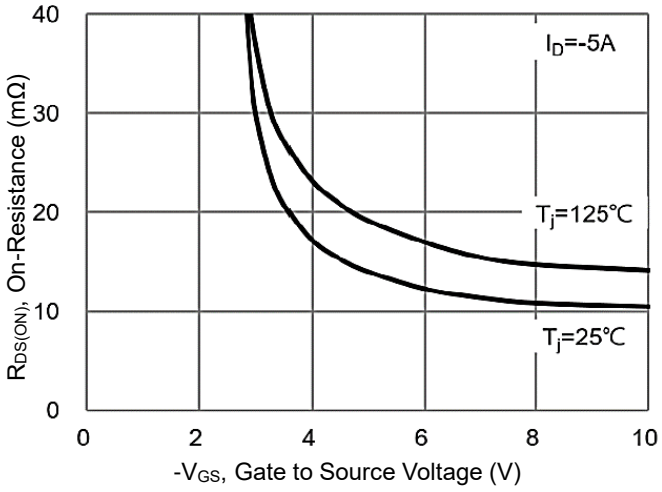
On-Resistance vs. Drain Current



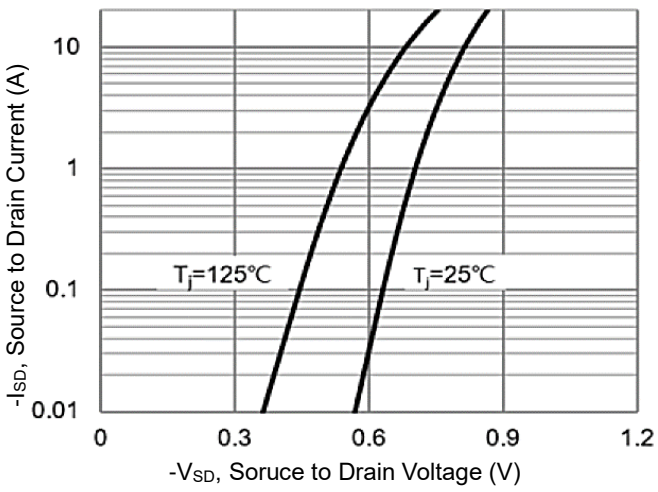
Gate Charge Waveform



On-Resistance Variation with VGS

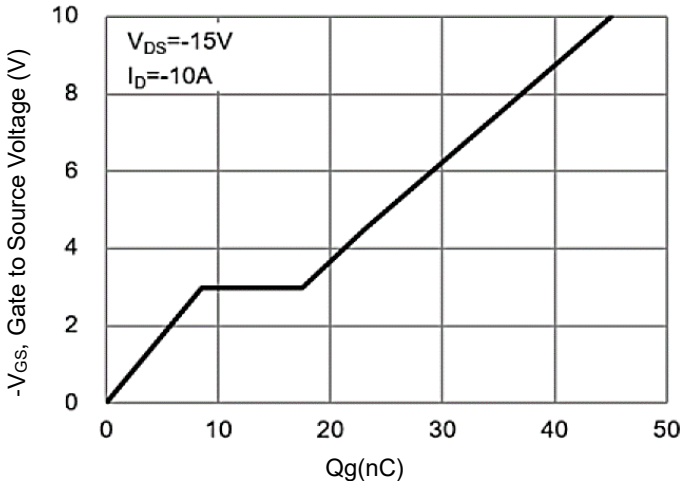


Body Diode

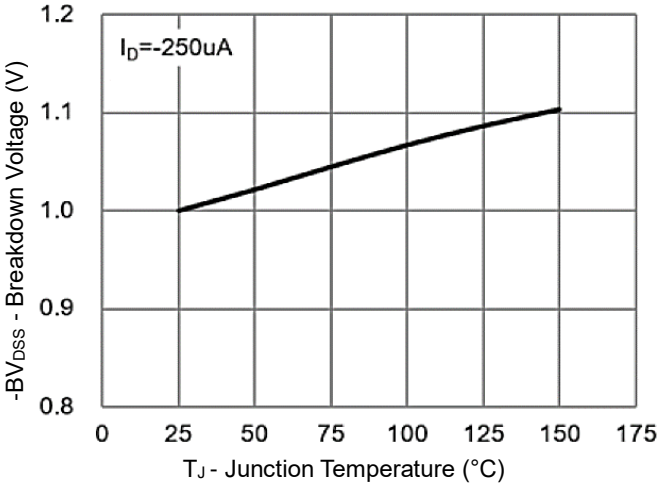


CHARACTERISTIC CURVES

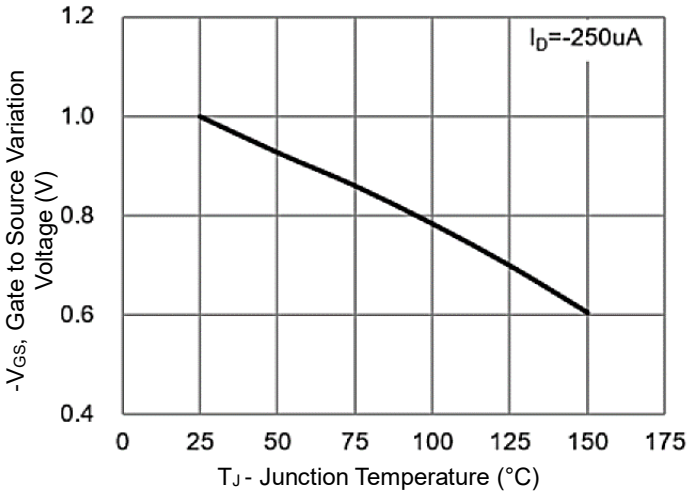
Gate Charge



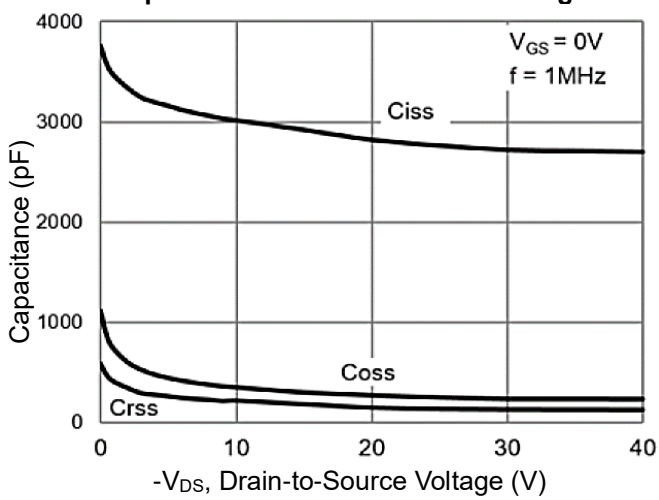
Breakdown Voltage vs Junction Temperature



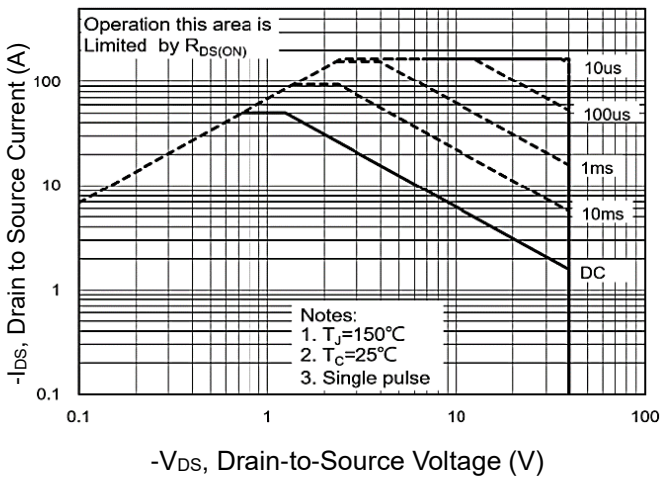
Threshold Votlage Variation with Temperature



Capacitance vs. Drain-Source Voltage



Maximum Safe Operating Area



Normalized Thermal Transietn Impedance