

P-Channel MOSFET

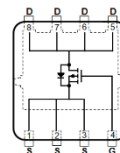
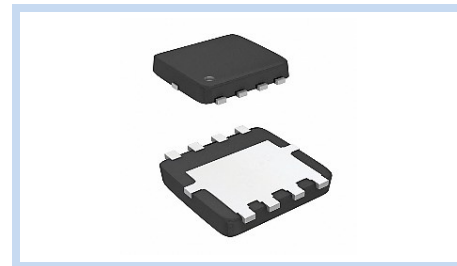
60V 38A DFN3333-8L AEC-Q101

MFT6P38D33A

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FEATURE

- $R_{DS(ON)} < 28m\Omega$ at $V_{GS} = -10V$
- $R_{DS(ON)} < 38m\Omega$ at $V_{GS} = -4.5V$
- High Switching Speed
- Application: Load Switches, DC-DC Conversion, Motor Drives
- AEC-Q101 Compliant



MECHANICAL DATA

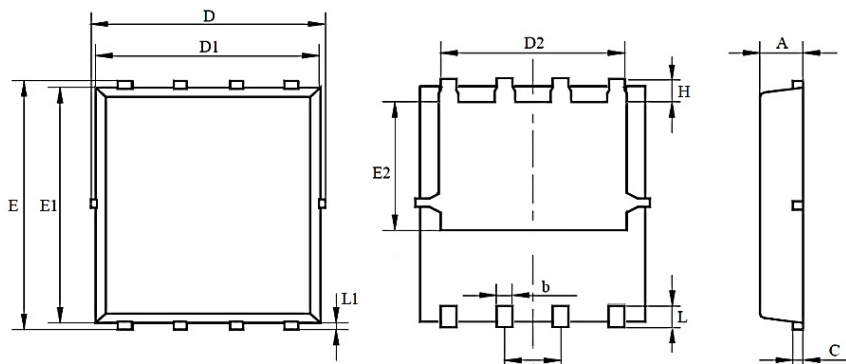
- Case: DFN3333-8L package
- Terminal: Solderable per MIL-STD-750, Method 2026

MAXIMUM RATINGS

Parameter, $T_A = 25^\circ\text{C}$		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	-60	V
Gate-Source Voltage		V_{GS}	± 20	V
Drain Current – Continuous	$T_C = 25^\circ\text{C}$	I_D	-38	A
	$T_C = 100^\circ\text{C}$		-27	
	$T_A = 25^\circ\text{C}$		-6.7	
	$T_A = 70^\circ\text{C}$		-6	
Drain Current – Pulsed	$T_C = 25^\circ\text{C}$	I_{DM}	-80	A
Power Dissipation	$T_C = 25^\circ\text{C}$	P_D	75	W
	$T_C = 100^\circ\text{C}$		38	
	$T_A = 25^\circ\text{C}$		2.5	
	$T_A = 70^\circ\text{C}$		1.8	
Single Pulse Avalanche Current		I_{AS}	-14	A
Single Pulse Avalanche Energy		E_{AS}	98	mJ
Typical Thermal Resistance	Junction to Case	$R_{\theta JC}$	2	$^\circ\text{C/W}$
	Junction to Ambient	$R_{\theta JA}$	60	
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55~175	$^\circ\text{C}$

DIMENSIONS

Item	Min (mm)	Max (mm)
A	0.70	0.80
b	0.25	0.35
c	0.10	0.25
D	3.30	
D1	3.00	3.20
D2	-	2.59
E	3.30	
E1	3.00	3.20
E2	-	1.98
e	0.65 BSC	
L	0.30	0.56
L1	0.05	0.15
H	0.30	0.56



ELECTRICAL CHARACTERISTICS

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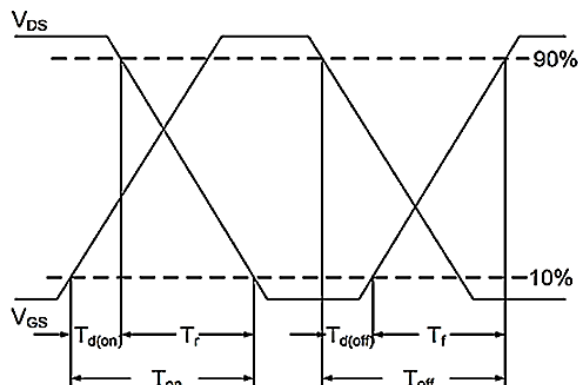
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Off Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	BV_{DSS}	-60	--	--	V
Zero Gate Voltage Drain Current	$V_{DS}=-60V, V_{GS}=0V$	I_{DSS}	--	--	-1	μA
Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	I_{GSS}	--	--	± 100	nA
On Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Static Drain-Source On-Resistance	$V_{GS}=-10V, I_D=-20A$	$R_{DS(ON)}$	--	22.3	28.0	m Ω
	$V_{GS}=-4.5V, I_D=-10A$		--	29.5	38.0	
Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	$V_{GS(th)}$	-1.0	-1.7	-2.5	V
Dynamic Characteristics	Conditions	Symbol	Min	Typ.	Max	Unit
Total Gate Charge	$V_{DS}=-30V, I_D=-20A$ $V_{GS}=-10V$	Q_g	--	44	58	nC
Gate-Source Charge		Q_{gs}	--	11	--	
Gate-Drain Charge		Q_{gd}	--	7	--	
Turn-On Delay Time	$V_{DS}=-30V, I_D=-20A$ $V_{GS}=-10V, R_G=3\Omega$	$T_{d(on)}$	--	7	--	ns
Rise Time		T_r	--	9	--	
Turn-Off Delay Time		$T_{d(off)}$	--	41	--	
Fall Time		T_f	--	21	--	
Input Capacitance	$V_{DS}=-30V, V_{GS}=0V$ $f=1MHz$	C_{iss}	--	2530	3290	pF
Output Capacitance		C_{oss}	--	151	228	
Reverse Transfer Capacitance		C_{rss}	--	108	162	
Gate Resistance	$f=1MHz$	R_g	--	4.8	--	Ω
Drain-Source Body Diode	Conditions	Symbol	Min	Typ.	Max	Unit
Continuous Source Current	$T_C=25^\circ C$	I_S	--	--	-38	A
Pulse Source Current		I_{SM}	--	--	-80	A
Diode Forward Voltage	$V_{GS}=0V, I_S=-20A$	V_{SD}	--	-0.85	-1.3	V
Reverse Recovery Time	$V_{DD}=-30V, V_{GS}=0V$ $I_D=-20A, dI_S/dt=100A/\mu s$	T_{rr}	--	16	--	ns
Reverse Recovery Charge		Q_{rr}	--	10	--	nC

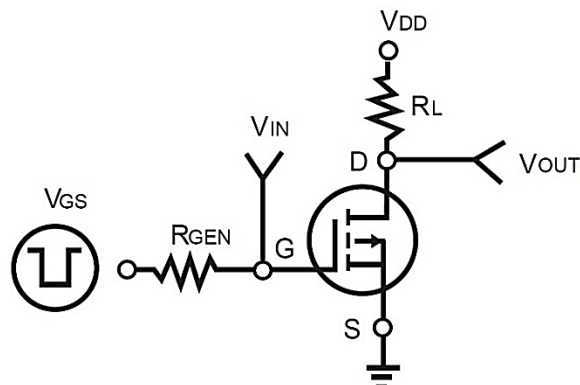
Note:

1. Pulse width<300 μs , Duty cycle<2%
2. The maximum current rating is package limited
3. $R_{\theta JA}$ 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 2oz.square pad of copper.
4. E_{AS} is calculated based on the condition of $L=1mH, I_{AS}=-14A, V_{GS}=-10V, V_{DD}=-30V$. 100% test at $L=0.5mH, I_{AS}=-14A$ in production.

Switching Time Waveform



Switching Test Circuit



CHARACTERISTIC CURVES

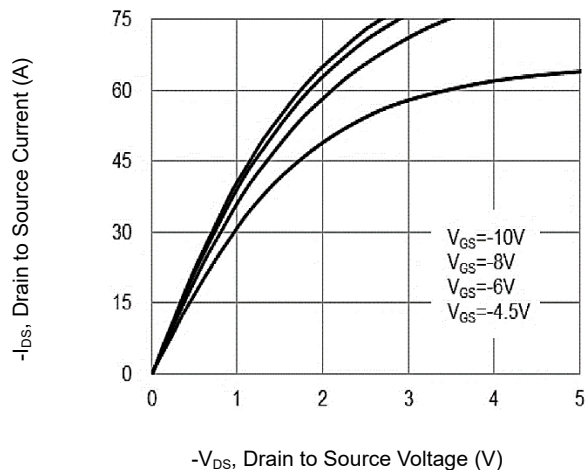
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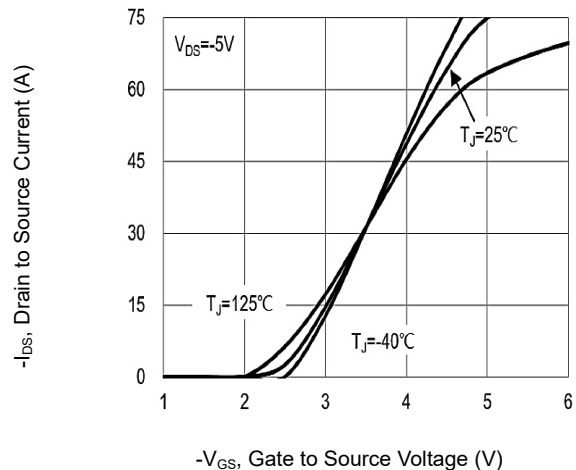
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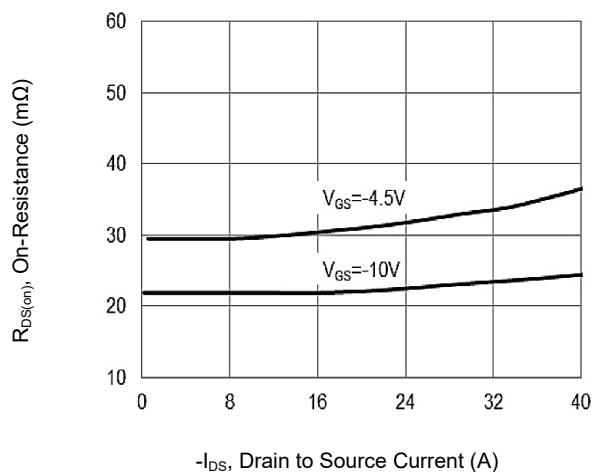
On-Region Characteristic



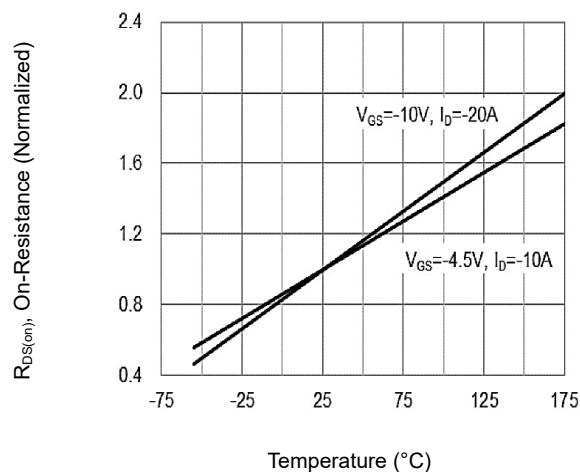
Transfer Characteristics



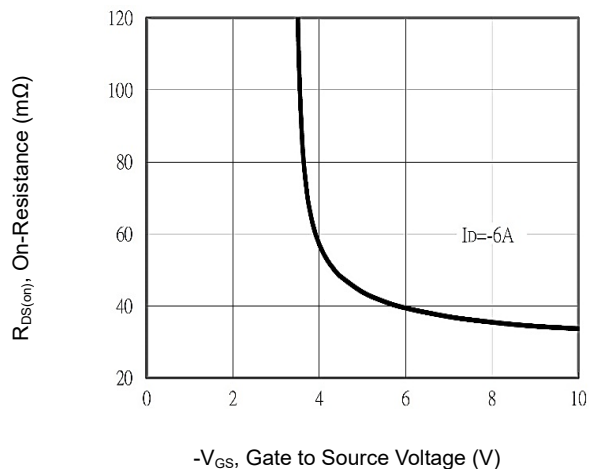
On-Resistance vs. Drain Current



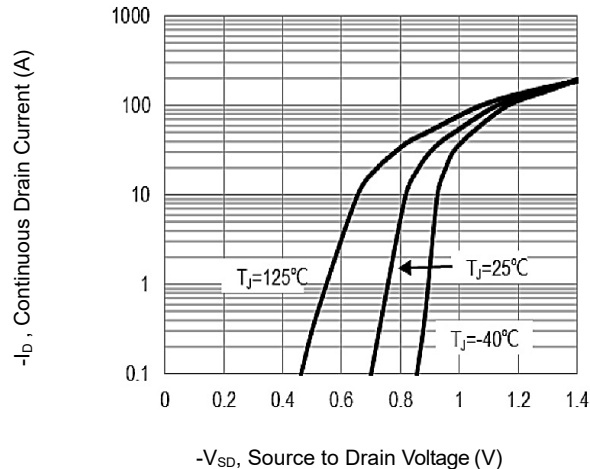
On-Resistance vs. Junction Temperature



On-Resistance Variation with VGS



Source-Drain Diode Forward Voltage



CHARACTERISTIC CURVES

Gate-Charge Characteristics

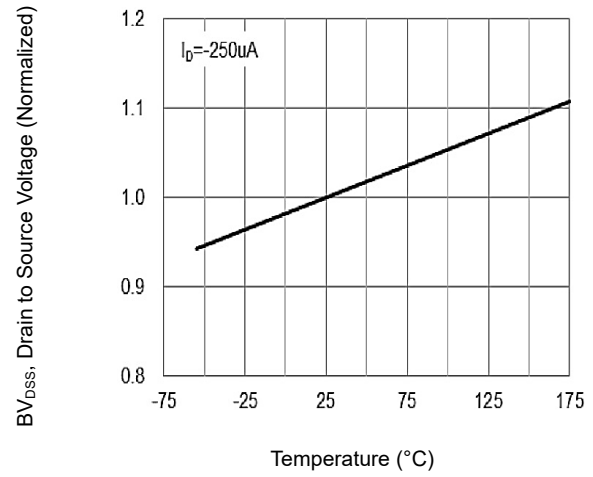
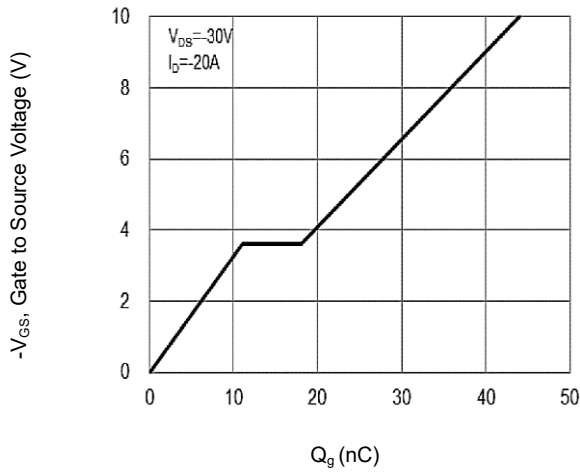
Breakdown Voltage Variation vs. Temperature

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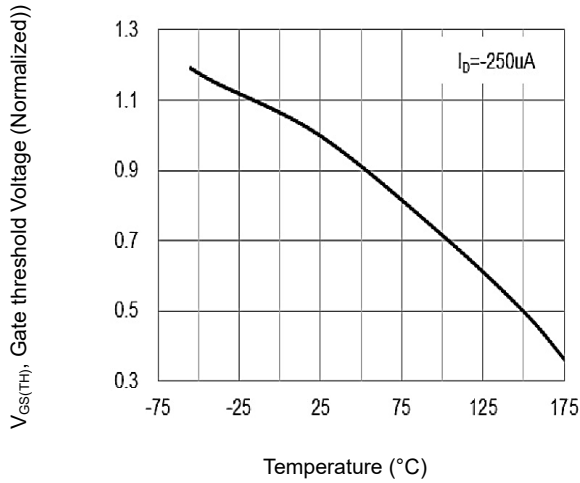
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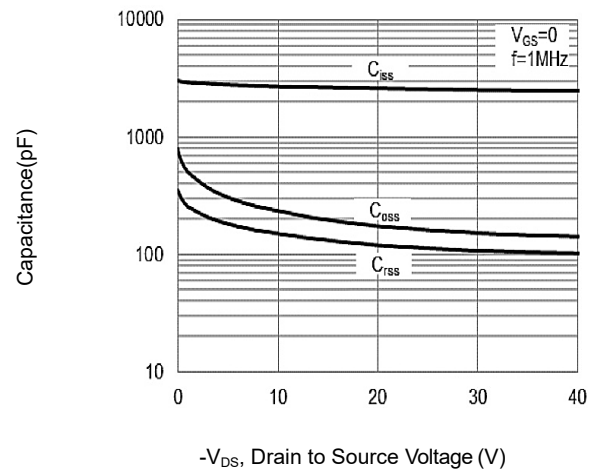
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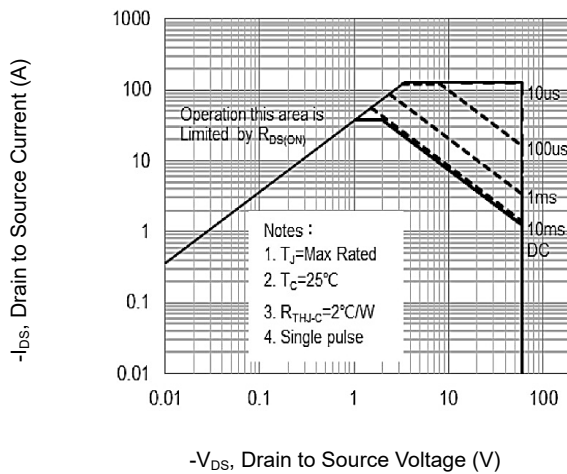
Threshold Voltage Variation with Temperature



Capacitance vs. Drain-Source Voltage



Maximum Safe Operating Area



Normalized Transient Thermal Impedance

