

P-Channel 30 V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω) (Max.)	I _D (A)	Q _g (Typ.)
- 30	0.018 at V _{GS} = - 4.5 V	- 36 ^a	33 nC
	0.030 at V _{GS} = - 2.5 V	- 25 ^a	

FEATURES

- DT-Trench Power MOSFET
- Thermally Enhanced DFN3X3 Package
- Small Footprint Area
- Low On-Resistance

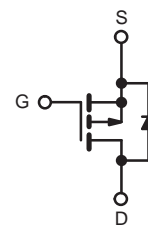
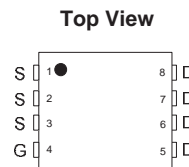
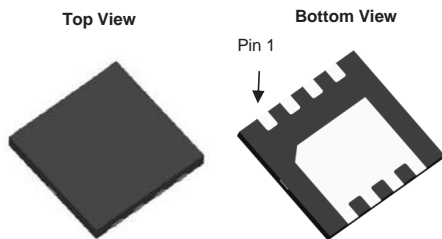


RoHS
COMPLIANT

APPLICATIONS

- Load Switch, PA Switch, and Battery Switch for Portable Devices

DFN 3x3 EP



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C, unless otherwise noted)			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V _{DS}	- 30	V
Gate-Source Voltage	V _{GS}	± 25	
Continuous Drain Current (T _J = 150 °C)	I _D	T _C = 25 °C	- 36 ^a
		T _C = 70 °C	- 26 ^a
		T _A = 25 °C	- 16 ^{b, c}
		T _A = 70 °C	- 9 ^{b, c}
Pulsed Drain Current (t = 300 μs)	I _{DM}	- 145	A
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	
		T _A = 25 °C	- 12 ^{b, c}
Maximum Power Dissipation	P _D	T _C = 25 °C	38
		T _C = 70 °C	20
		T _A = 25 °C	3.5 ^{b, c}
		T _A = 70 °C	2.1 ^{b, c}
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150	°C
Soldering Recommendations (Peak Temperature) ^{d, e}		260	

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, f}	t ≤ 5 s	R _{thJA}	27	35	°C/W
Maximum Junction-to-Case (Drain)	Steady State	R _{thJC}	3.3	4.5	

Notes:

- Package limited.
- Surface mounted on 1" x 1" FR4 board.
- t = 2 s.
- See solder profile The DFN3X3 is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
- Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.
- Maximum under steady state conditions is 80 °C/W.

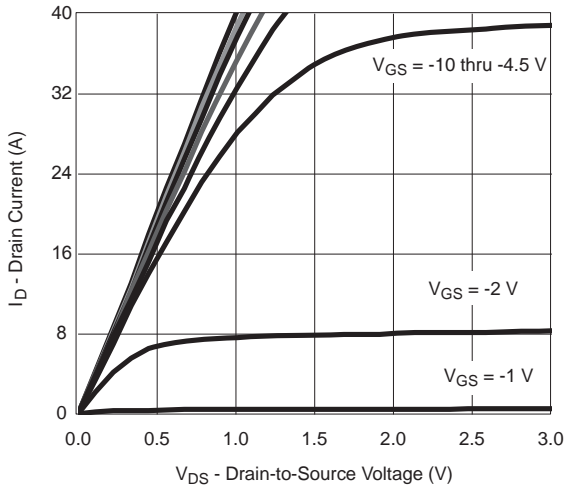
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-30			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		-11		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			2.7		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-1		-3	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -24\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
		$V_{DS} = -24\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			-10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} \leq -5\text{ V}, V_{GS} = -4.5\text{ V}$	-145			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -10\text{ A}$		0.018	0.024	Ω
		$V_{GS} = -4.5\text{ V}, I_D = -8\text{ A}$		0.030	0.034	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -10\text{ V}, I_D = -10\text{ A}$		40		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = -24\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		2100		μF
Output Capacitance	C_{oss}			980		
Reverse Transfer Capacitance	C_{rss}			490		
Total Gate Charge	Q_g	$V_{DS} = -24\text{ V}, V_{GS} = -8\text{ V}, I_D = -10\text{ A}$		33	52	nC
			$V_{DS} = -24\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -10\text{ A}$		20	
Gate-Source Charge	Q_{gs}			4		
Gate-Drain Charge	Q_{gd}		6			
Gate Resistance	R_g	$f = 1\text{ MHz}$		6		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -24\text{ V}, R_L = 0.75\text{ }\Omega$ $I_D \cong -8\text{ A}, V_{GEN} = -4.5\text{ V}, R_g = 1\text{ }\Omega$		16	27	ns
Rise Time	t_r			17	24	
Turn-Off Delay Time	$t_{d(off)}$			21	30	
Fall Time	t_f			44	65	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -24\text{ V}, R_L = 0.75\text{ }\Omega$ $I_D \cong -8\text{ A}, V_{GEN} = -8\text{ V}, R_g = 1\text{ }\Omega$		11	17	
Rise Time	t_r			15	20	
Turn-Off Delay Time	$t_{d(off)}$			30	50	
Fall Time	t_f			43	66	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			-36	A
Pulse Diode Forward Current	I_{SM}				145	
Body Diode Voltage	V_{SD}	$I_S = -8\text{ A}, V_{GS} = 0\text{ V}$		-0.7	-1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -8\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		40	65	ns
Body Diode Reverse Recovery Charge	Q_{rr}			20	35	nC
Reverse Recovery Fall Time	t_a			15		ns
Reverse Recovery Rise Time	t_b			26		

Notes:

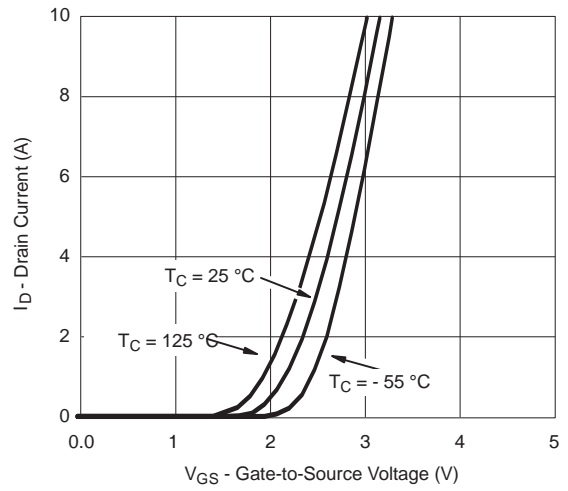
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

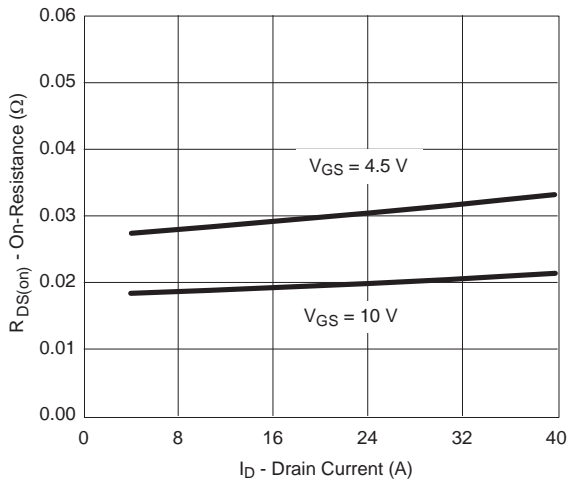
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



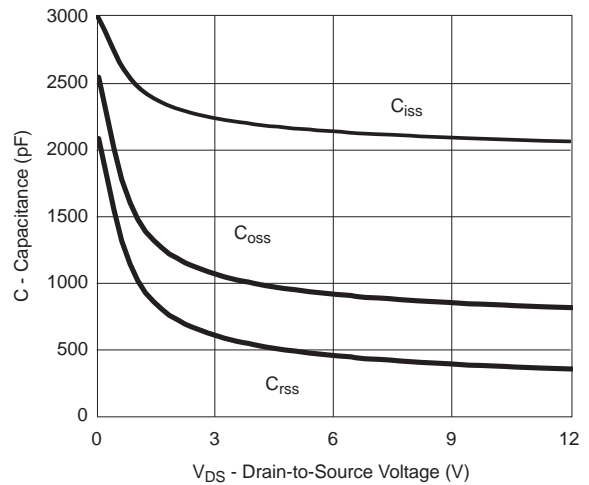
Output Characteristics



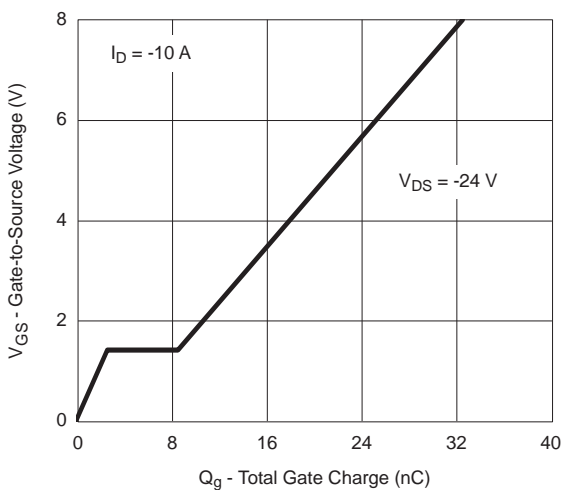
Transfer Characteristics



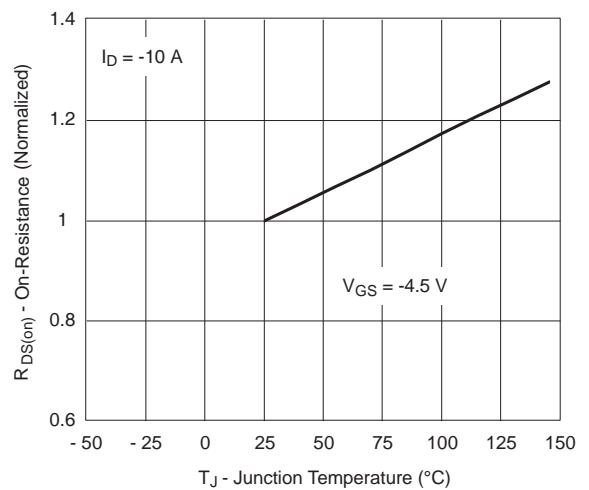
On-Resistance vs. Drain Current and Gate Voltage



Capacitance

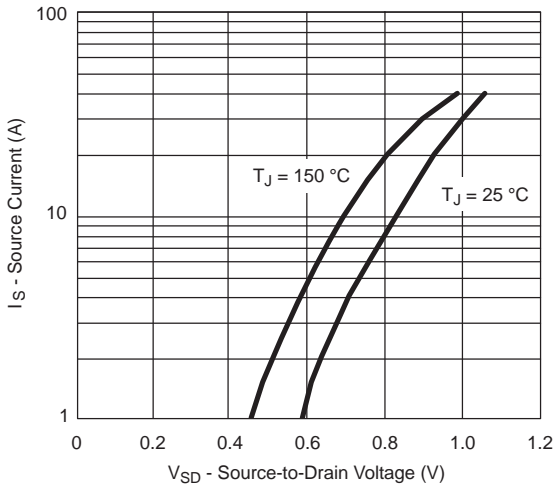


Gate Charge

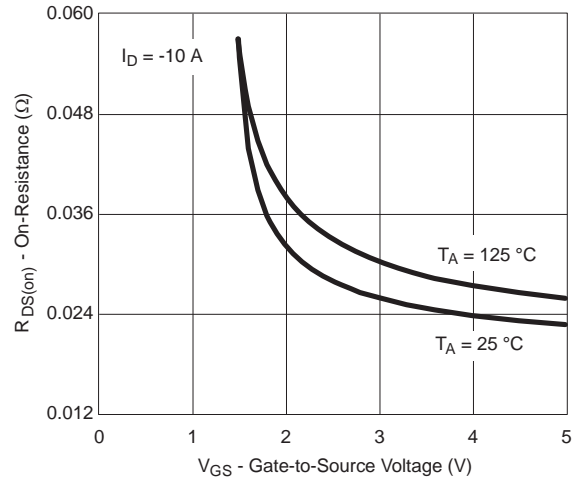


On-Resistance vs. Junction Temperature

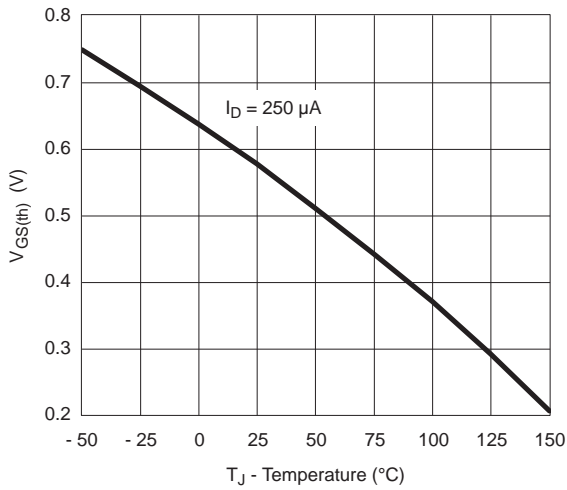
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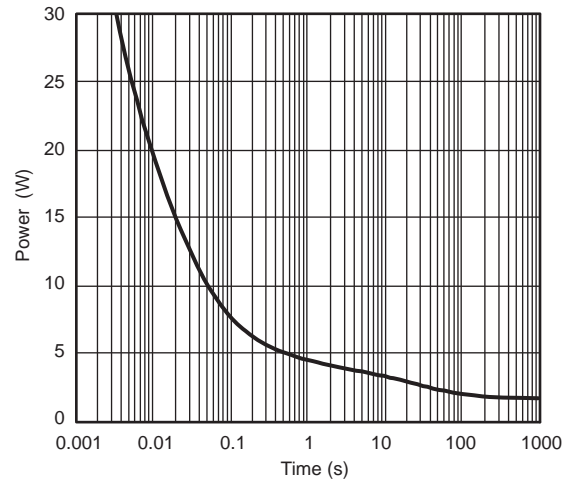
Source-Drain Diode Forward Voltage



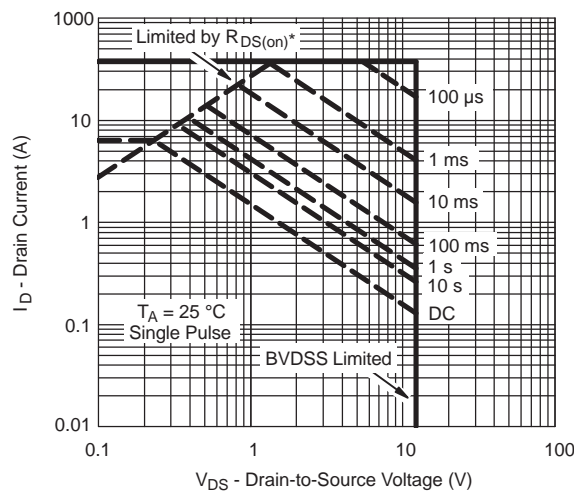
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

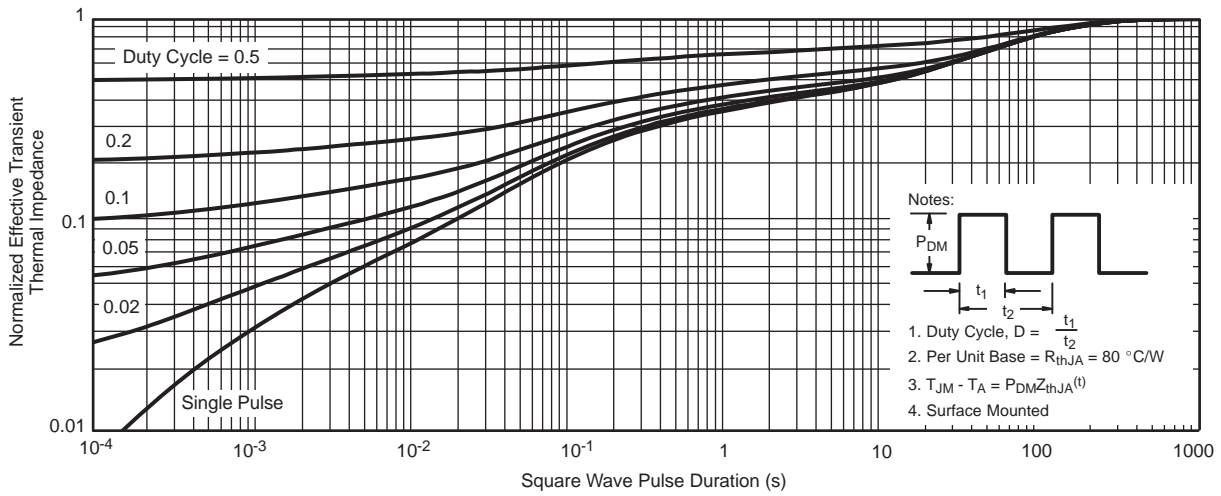


Single Pulse Power, Junction-to-Ambient

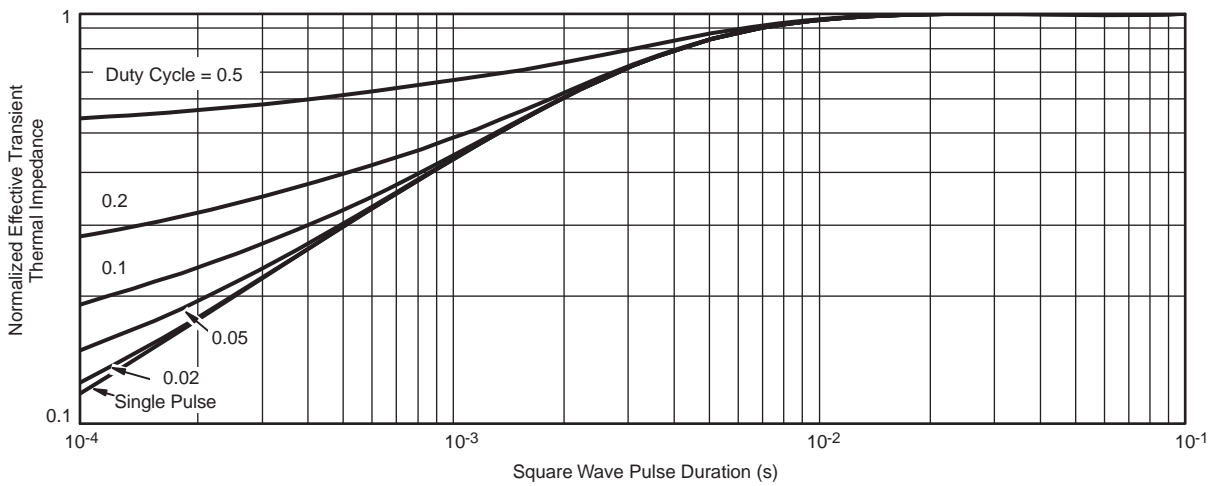


Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

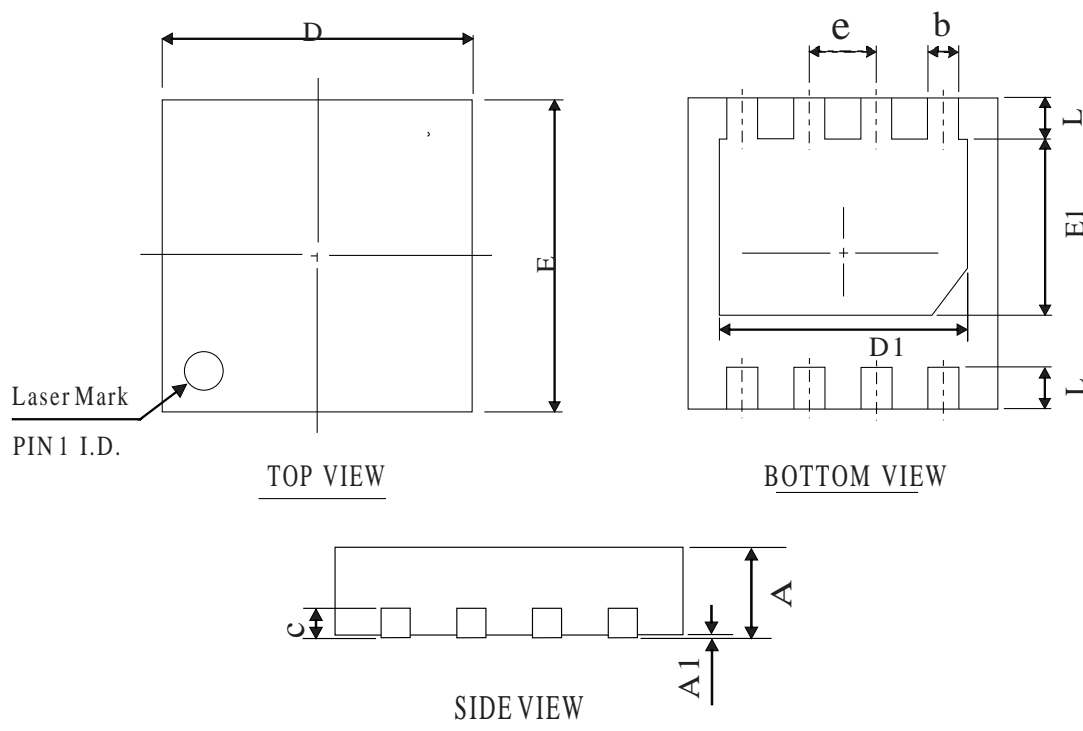


Normalized Thermal Transient Impedance, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

DFN3*3-8L PACKAGE OUTLINE



COMMON DIMENSIONS (UNITS OF MEASURE=mm)

SYMBOL	MIN	NOM	MAX
A	0.60	0.75	0.90
A1	0.00	0.02	0.08
b	0.20	0.30	0.45
D	2.85	3.00	3.15
E	2.85	3.00	3.15
D1	2.10	2.40	2.70
E1	1.50	1.70	2.00
L	0.20	0.40	0.60
c	0.203 REF		
e	0.65 BSC		

OTHER DIMENSIONS

A	0.50	0.55	0.60
A	0.40	0.45	0.50

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