Dual P-Channel 20-V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[d, e]	Q_g (Typ.)
- 20	0.040 at V_{GS} = - 10 V	- 5.3	17 nC
	0.045 at V_{GS} = - 4.5 V	- 4.3	

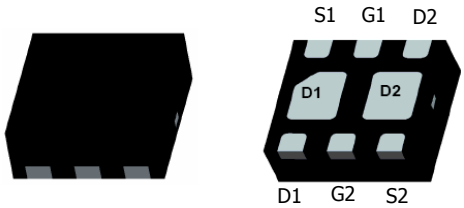
FEATURES

- **Halogen-free**
- Trench Power MOSFET
- 100 % UIS Tested

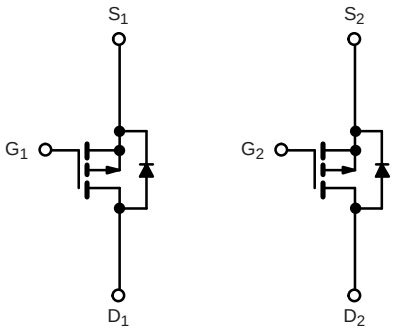
APPLICATIONS

- Load Switches

Pb-free
RoHS COMPLIANT

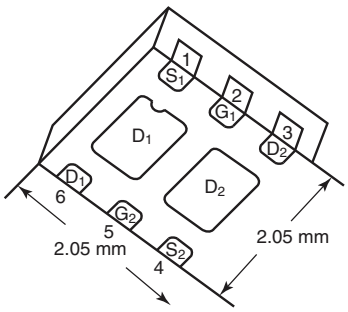


DFN 2x2 Package



P-Channel MOSFET P-Channel MOSFET

DFN2X2



ABSOLUTE MAXIMUM RATINGS T_A = 25 °C, unless otherwise noted				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-Source Voltage		V_{DS}	- 20	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 150 °C)	T_C = 25 °C	I_D	- 5.3[e]	A
	T_C = 70 °C		- 5.0[e]	
	T_A = 25 °C		- 5.3[a, b]	
	T_A = 70 °C		- 4.9[a, b]	
Pulsed Drain Current		I_{DM}	- 32[e]	
Continuous Source-Drain Diode Current	T_C = 25 °C	I_S	- 4.1	
	T_A = 25 °C		- 2.0[a, b]	
Avalanche Current	L = 0.1 mH	I_{AS}	- 20	
Single-Pulse Avalanche Energy		E_{AS}	20	mJ
Maximum Power Dissipation	T_C = 25 °C	P_D	5.0	W
	T_C = 70 °C		3.2	
	T_A = 25 °C		2.5[a, b]	
	T_A = 70 °C		1.6[a, b]	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS					
Parameter		**Symbol**	**Typical**	**Maximum**	**Unit**
Maximum Junction-to-Ambient[a, c]	t ≤ 10 s	R_{thJA}	38	50	°C/W
Maximum Junction-to-Foot	Steady State	R_{thJF}	20	25	

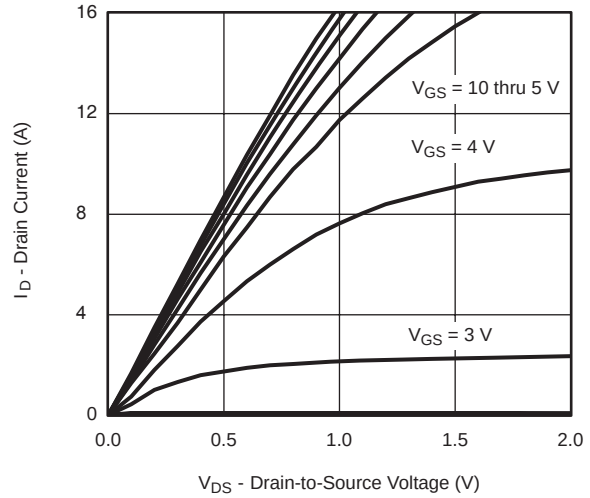
Notes:
a. Surface mounted on 1" x 1" FR4 board.
b. t = 10 s.
c. Maximum under Steady State conditions is 85 °C/W.
d. Based on T_C = 25 °C.
e. Limited by package.

SPECIFICATIONS T_J = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = - 250 µA	- 20			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	I_D = - 250 µA		- 31		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			4.5		
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = - 250 µA	- 0.4		- 2.0	V
Gate-Source Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = - 30 V, V_{GS} = 0 V			- 1	µA
		V_{DS} = - 30 V, V_{GS} = 0 V, T_J = 55 °C			- 5	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq$ - 10 V, V_{GS} = - 10 V	- 30			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 10 V, I_D = - 6.3 A		0.040		Ω
		V_{GS} = - 4.5 V, I_D = - 6.2 A		0.045		
Forward Transconductance[a]	g_{fs}	V_{DS} = - 10 V, I_D = - 6.1 A		23		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{DS} = - 15 V, V_{GS} = 0 V, f = 1 MHz		1350		pF
Output Capacitance	C_{oss}			215		
Reverse Transfer Capacitance	C_{rss}			185		
Total Gate Charge	Q_g	V_{DS} = - 15 V, V_{GS} = - 10 V, I_D = - 6.1 A		32	50	nC
		V_{DS} = - 15 V, V_{GS} = - 4.5 V, I_D = - 6.1 A		15	25	
Gate-Source Charge	Q_{gs}			4		
Gate-Drain Charge	Q_{gd}			7.5		
Gate Resistance	R_g	f = 1 MHz		5.8		Ω
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 15 V, R_L = 15 Ω $I_D \cong$ - 1 A, V_{GEN} = - 10 V, R_g = 1 Ω		10	15	ns
Rise Time	t_r			8	15	
Turn-Off DelayTime	$t_{d(off)}$			45	70	
Fall Time	t_f			12	25	
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = - 15 V, R_L = 15 Ω $I_D \cong$ - 1 A, V_{GEN} = - 4.5 V, R_g = 1 Ω		42	70	
Rise Time	t_r			35	60	
Turn-Off DelayTime	$t_{d(off)}$			40	70	
Fall Time	t_f			16	30	
Drain-Source Body Diode Characteristics						
Continous Source-Drain Diode Current	I_S	T_C = 25 °C			- 4.1	A
Pulse Diode Forward Current	I_{SM}				- 32	
Body Diode Voltage	V_{SD}	I_S = - 2 A, V_{GS} = 0 V		- 0.75	- 1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = - 2 A, dI/dt = 100 A/µs, T_J = 25 °C		34	60	ns
Body Diode Reverse Recovery Charge	Q_{rr}			22	40	nC
Reverse Recovery Fall Time	t_a			11		ns
Reverse Recovery Rise Time	t_b			23		

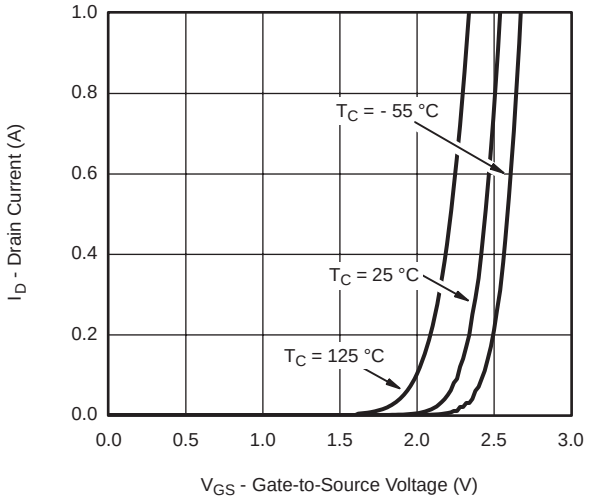
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.

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.

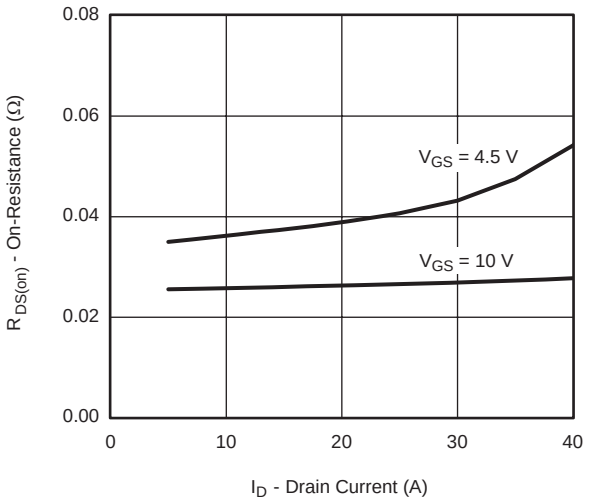
TYPICAL CHARACTERISTICS 25 C, unless otherwise noted



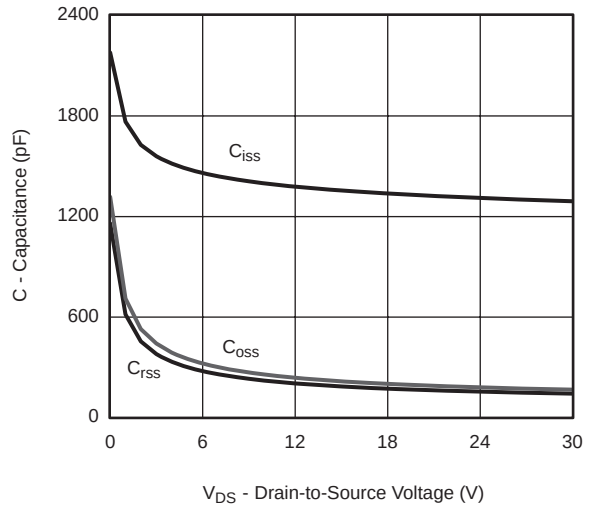
Output Characteristics



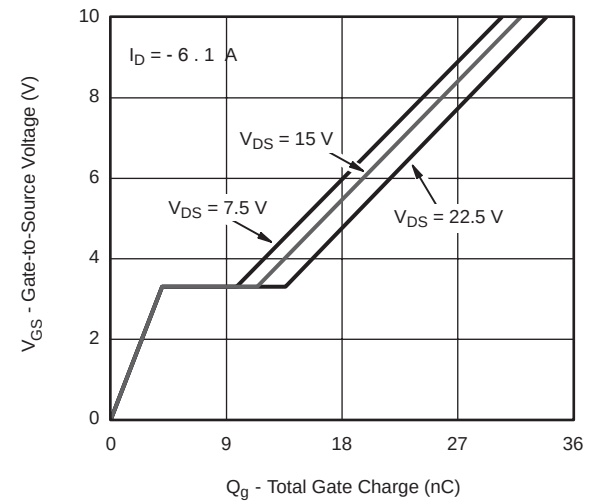
Transfer Characteristics



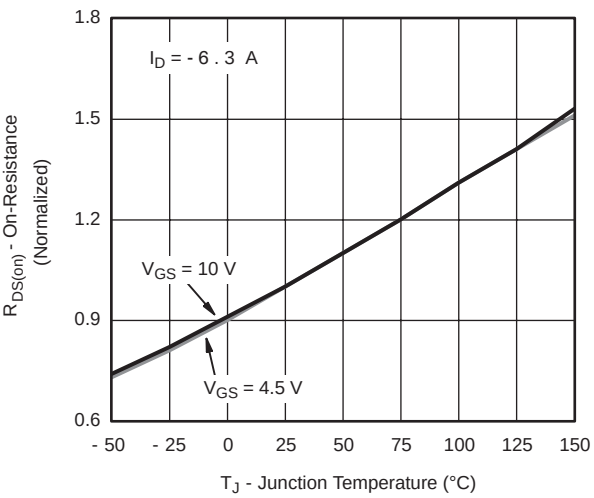
On-Resistance vs. Drain Current



Capacitance

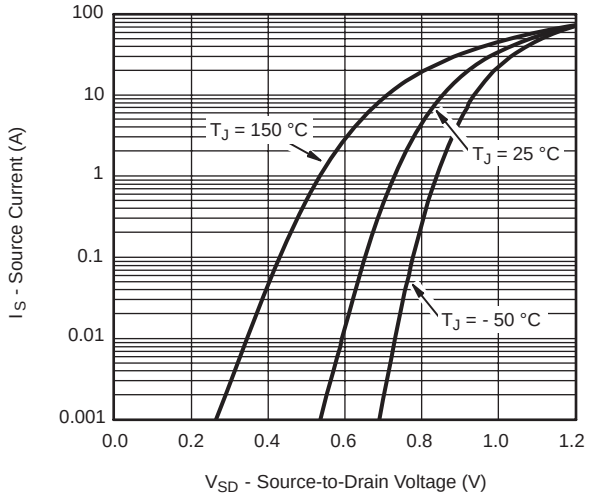


Gate Charge

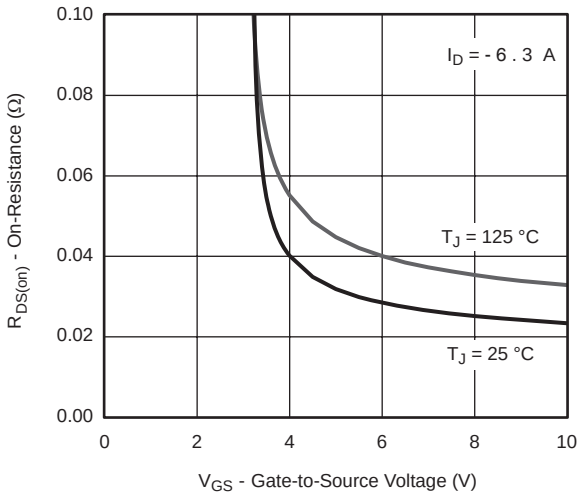


On-Resistance vs. Junction Temperature

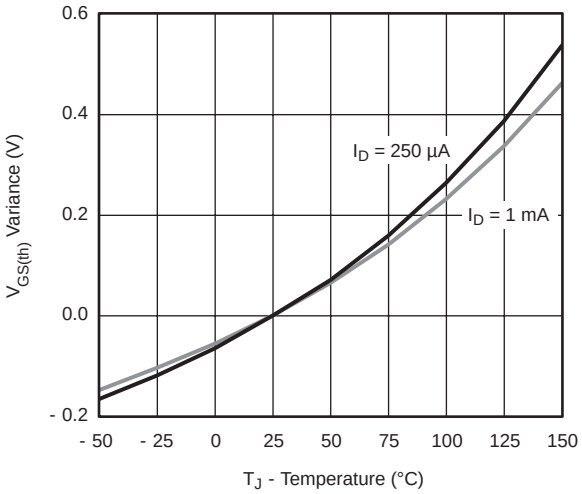
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



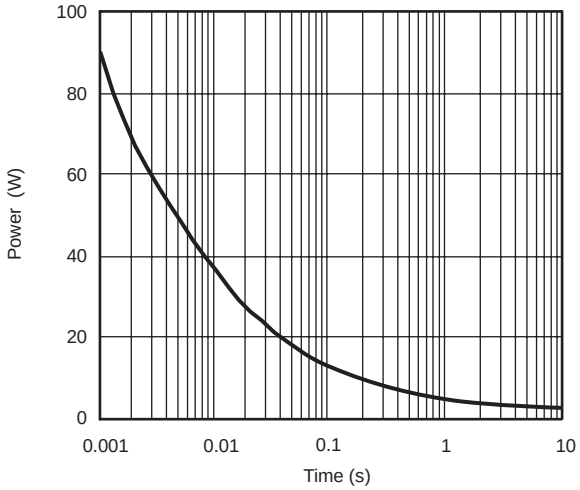
Source-Drain Diode Forward Voltage



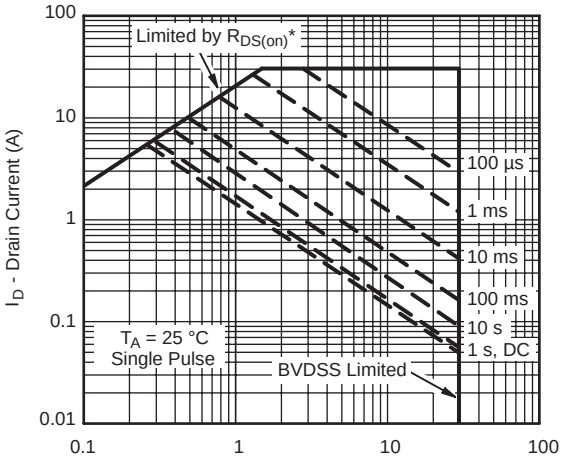
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



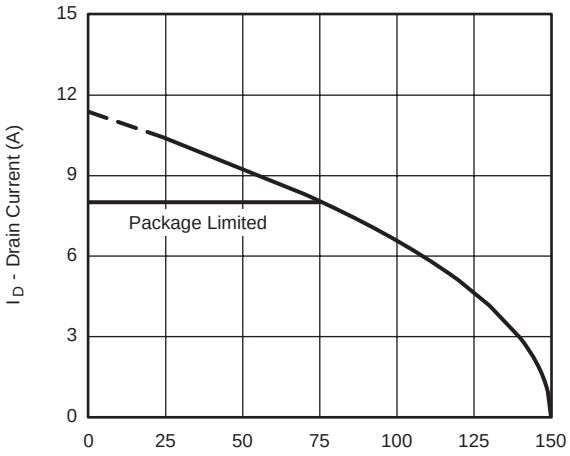
Single Pulse Power, Junction-to-Ambient



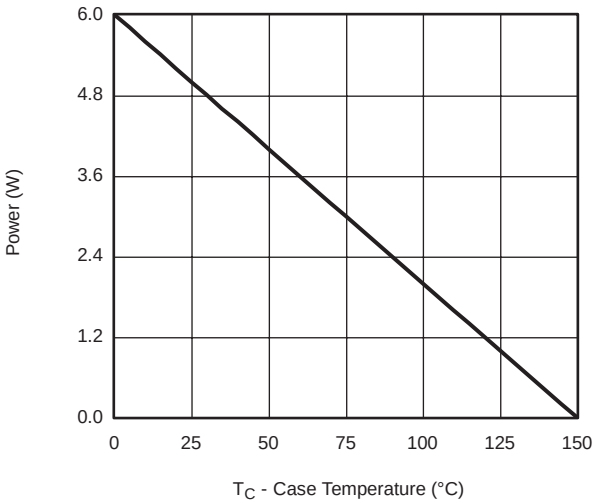
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area

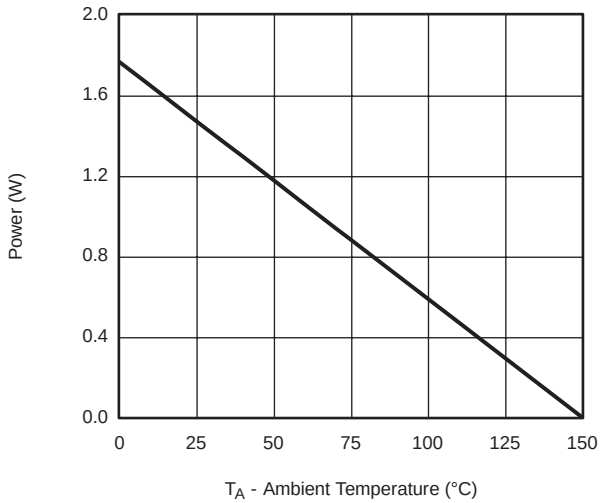
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



Current Derating*



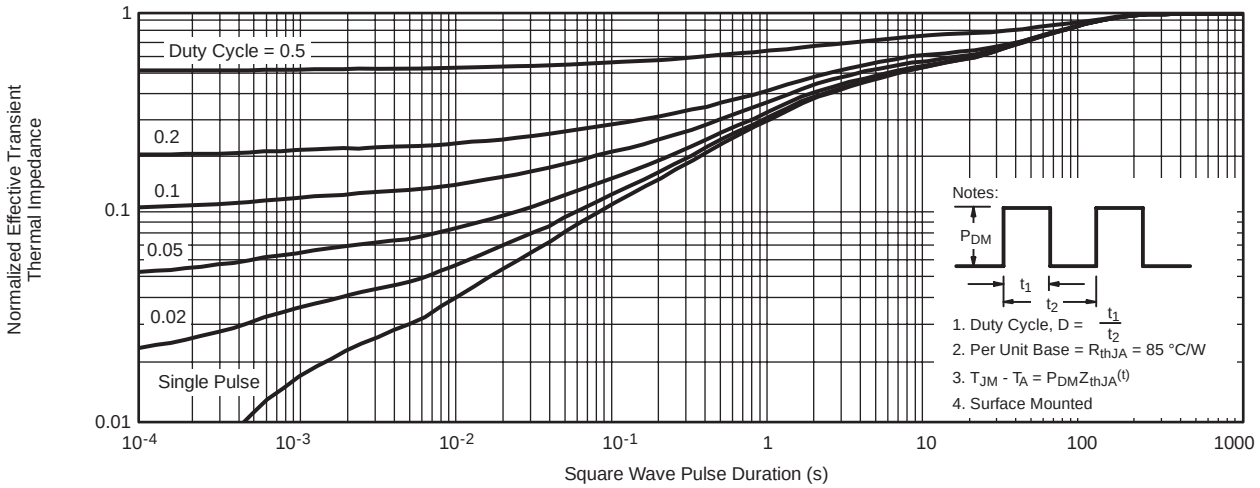
Power, Junction-to-Foot



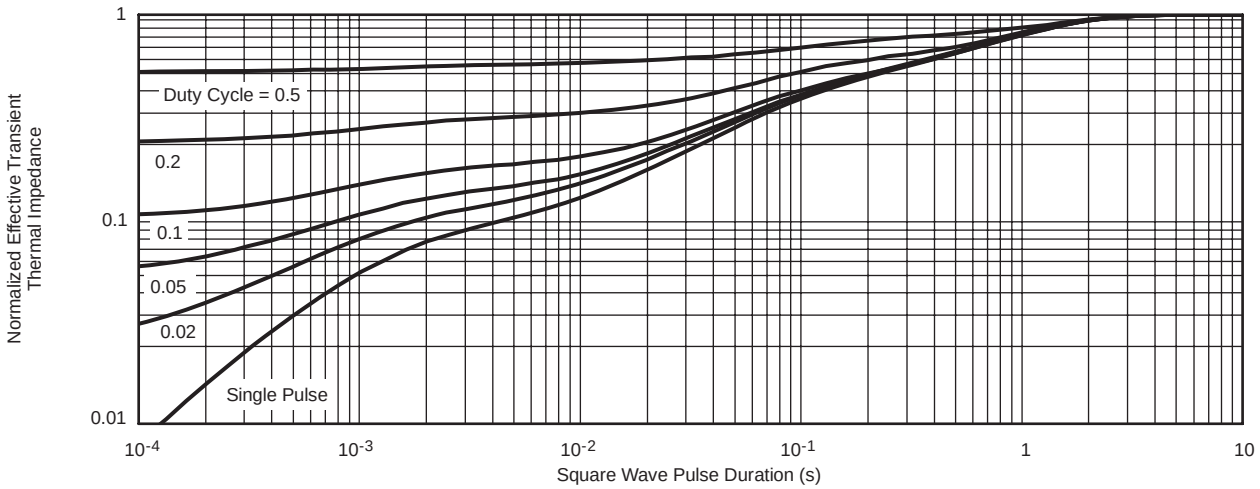
Power Derating, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max)}$ = 150 °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

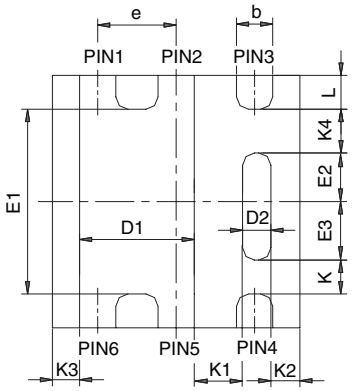


Normalized Thermal Transient Impedance, Junction-to-Ambient

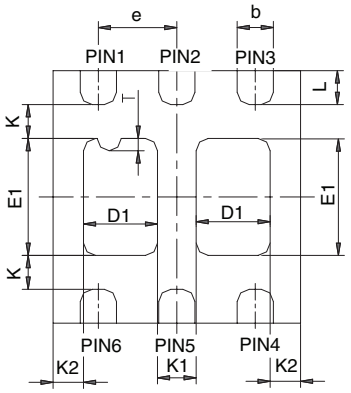


Normalized Thermal Transient Impedance, Junction-to-Foot

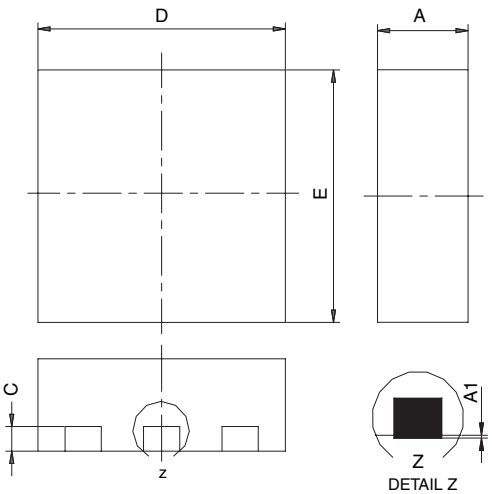
DFN2X2



BACKSIDE VIEW OF SINGLE



BACKSIDE VIEW OF DUAL



DETAIL Z

Notes:
1. All dimensions are in millimeters
2. Package outline exclusive of mold flash and metal burr
3. Package outline inclusive of plating

DIM	SINGLE PAD						DUAL PAD					
	MILLIMETERS			INCHES			MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max
A	0.675	0.75	0.80	0.027	0.030	0.032	0.675	0.75	0.80	0.027	0.030	0.032
A1	0	-	0.05	0	-	0.002	0	-	0.05	0	-	0.002
b	0.23	0.30	0.38	0.009	0.012	0.015	0.23	0.30	0.38	0.009	0.012	0.015
C	0.15	0.20	0.25	0.006	0.008	0.010	0.15	0.20	0.25	0.006	0.008	0.010
D	1.98	2.05	2.15	0.078	0.081	0.085	1.98	2.05	2.15	0.078	0.081	0.085
D1	0.85	0.95	1.05	0.033	0.037	0.041	0.513	0.613	0.713	0.020	0.024	0.028
D2	0.135	0.235	0.335	0.005	0.009	0.013						
E	1.98	2.05	2.15	0.078	0.081	0.085	1.98	2.05	2.15	0.078	0.081	0.085
E1	1.40	1.50	1.60	0.055	0.059	0.063	0.85	0.95	1.05	0.033	0.037	0.041
E2	0.345	0.395	0.445	0.014	0.016	0.018						
E3	0.425	0.475	0.525	0.017	0.019	0.021						
e	0.65 BSC			0.026 BSC			0.65 BSC			0.026 BSC		
K	0.275 TYP			0.011 TYP			0.275 TYP			0.011 TYP		
K1	0.400 TYP			0.016 TYP			0.320 TYP			0.013 TYP		
K2	0.240 TYP			0.009 TYP			0.252 TYP			0.010 TYP		
K3	0.225 TYP			0.009 TYP								
K4	0.355 TYP			0.014 TYP								
L	0.175	0.275	0.375	0.007	0.011	0.015	0.175	0.275	0.375	0.007	0.011	0.015
T							0.05	0.10	0.15	0.002	0.004	0.006

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