P-CHANNEL ENHANCEMENT MODE MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)max}$	I_D T_A = 25°C
-20V	16mΩ @ V_{GS} = -4.5V	-12.8A
	25mΩ @ V_{GS} = -2.0V	-10A

Features and Benefits

- Low On-Resistance
- Low Input Capacitance
- Low Input/Output Leakage
- **ESD Protected Gate up to 2kV**
- **Lead Free by Design, RoHS Compliant (Note 1)**
- **"Green" Device (Note 2)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Description and Applications

This new generation MOSFET has been designed to minimize the on-state resistance ($R_{DS(on)}$) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

- DC-DC Converters
- Power management functions
- Notebook PC Applications
- Portable Equipment Applications

Mechanical Data

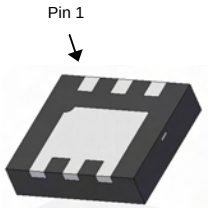
- Case: U-DFN2523-6
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish — NiPdAu over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.008 grams (approximate)



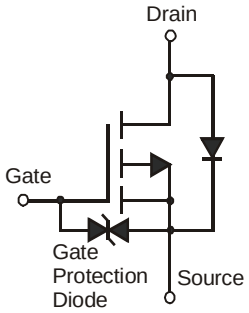
ESD PROTECTED TO 2kV

Pin 1, 2 = Source
Pin 3 = Gate
Pin 4, 5, 6 = Drain

U-DFN2523-6



Bottom View



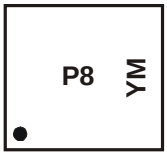
Equivalent Circuit

Ordering Information (Note 3)

Part Number	Case	Packaging
DMP2018LFK-7	U-DFN2523-6	3,000 / Tape & Reel
DMP2018LFK-13	U-DFN2523-6	10,000 / Tape & Reel

Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. No purposely added lead. Halogen and Antimony free.
2. Diodes Inc.'s "Green" policy can be found on our website at http://www.diodes.com.
3. For packaging details, go to our website at http://www.diodes.com.

Marking Information



P8 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: Y = 2011)
M = Month (ex: 9 = September)

Date Code Key

Year	2011	2012	2013	2014	2015	2016	2017
Code	Y	Z	A	B	C	D	E

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

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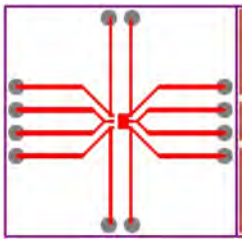
Maximum Ratings @T_A = 25°C unless otherwise specified

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V_{DSS}	-20	V
Gate-Source Voltage			V_{GSS}	±12	V
Continuous Drain Current (Note 5) V_{GS} = -4.5V	Steady State	T_A = 25°C T_A = 70°C	I_D	-9.2 -7.3	A
	t<5s	T_A = 25°C T_A = 70°C	I_D	-12.8 -10.3	A
Continuous Drain Current (Note 5) V_{GS} = -2.0V	Steady State	T_A = 25°C T_A = 70°C	I_D	-7.1 -6	A
	t<5s	T_A = 25°C T_A = 70°C	I_D	-10 -8.3	A
Maximum Continuous Body Diode Forward Current (Note 5)			I_S	-3	A
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I_{DM}	-90	A
Avalanche Current (Note 6)			I_{AS}	17	A
Repetitive Avalanche Energy (Note 6)			E_{AS}	72	mJ

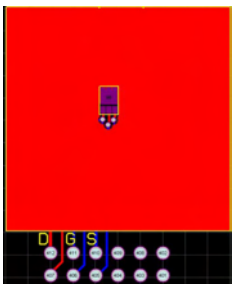
Thermal Characteristics

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 4)	T_A = 25°C	P_D	1	W
	T_A = 70°C		0.63	
Thermal Resistance, Junction to Ambient (Note 4)	Steady State	$R_{\theta JA}$	126	°C/W
	t<5s		60	
Total Power Dissipation (Note 5)	T_A = 25°C	P_D	2.1	W
	T_A = 70°C		1.3	
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	61	°C/W
	t<5s		29	
Thermal Resistance, Junction to Case		$R_{\theta JC}$	6.4	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Notes: 4. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.



Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal vias to bottom layer 1inch square copper plate



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Electrical Characteristics @ T_A = 25°C unless otherwise stated

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	-20	-	-	V	V_{GS} = 0V, I_D = -10mA
Zero Gate Voltage Drain Current T_J = 25°C	I_{DSS}	-	-	-1	µA	V_{DS} = -20V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	-	-	±2	µA	V_{GS} = ±10V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(th)}$	-0.45	-	-1.2	V	V_{DS} = -10V, I_D = -200µA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	-	10	16	mΩ	V_{GS} = -4.5V, I_D = -3.6A
		-	12	20		V_{GS} = -2.5V, I_D = -3.6A
		-	13.6	25		V_{GS} = -2.0V, I_D = -1.8A
		-	20	-		V_{GS} = -1.5V, I_D = -1A
Forward Transfer Admittance	$\|Y_{fs}\|$	10	17	-	S	V_{DS} = -10V, I_D = -3.6A
Diode Forward Voltage	V_{SD}	-	0.7	1.2	V	V_{GS} = 0V, I_S = -3.6A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	-	4748	-	pF	V_{DS} = -10V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	-	833	-		
Reverse Transfer Capacitance	C_{rss}	-	339	-		
Gate Resistance	R_g	-	6.2	-	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = -10V)	Q_g	-	113	-	nC	V_{DS} = -16V, I_D = -7.2A
Total Gate Charge (V_{GS} = -4.5V)	Q_g	-	53	-		
Gate-Source Charge	Q_{gs}	-	7.1	-		
Gate-Drain Charge	Q_{gd}	-	8.5	-		
Turn-On Delay Time	$t_{D(on)}$	-	22.8	-	ns	V_{DD} = -10V, V_{GS} = -4.5V, R_G = 4.7Ω, I_D = -3.6A
Turn-On Rise Time	t_r	-	29.8	-		
Turn-Off Delay Time	$t_{D(off)}$	-	240.8	-		
Turn-Off Fall Time	t_f	-	100.6	-		

Notes: 6. UIS in production with L = 0.5mH, TJ = 25°C
7 .Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to production testing.

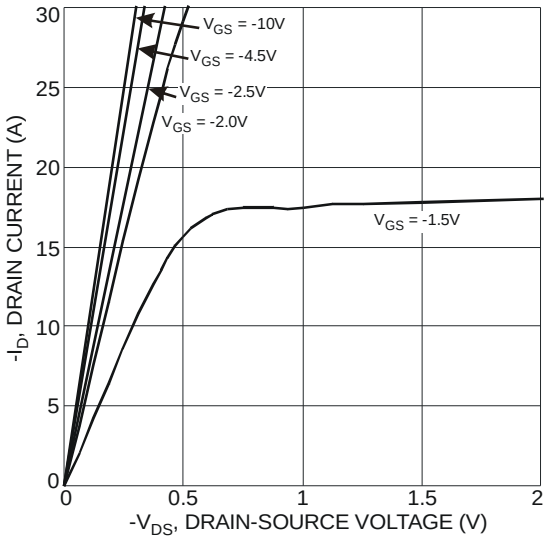


Fig. 1 Typical Output Characteristic

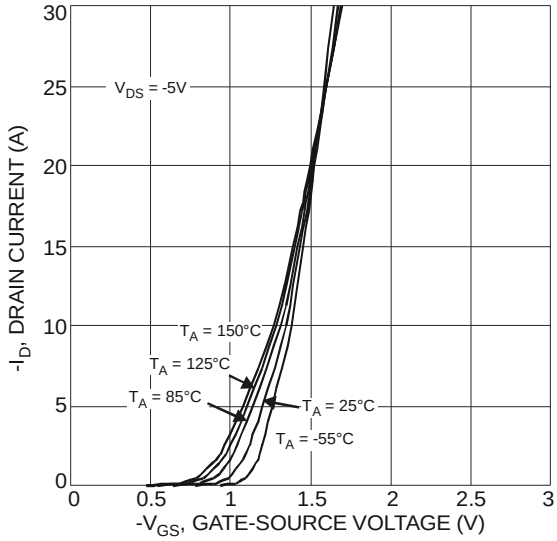


Fig. 2 Typical Transfer Characteristic

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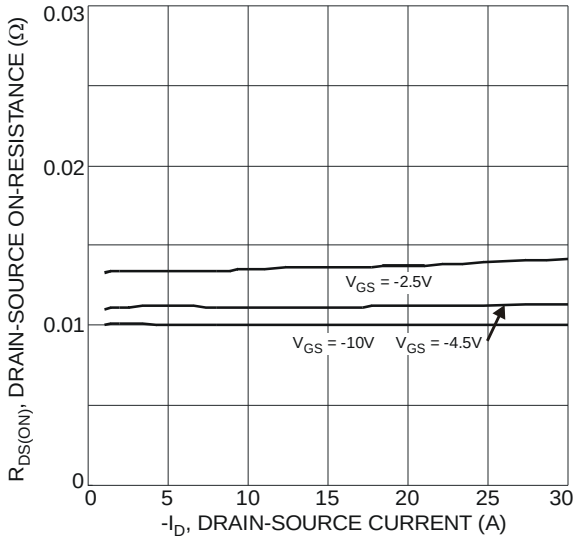


Fig. 3 Typical On-Resistance vs. Drain Current and Gate Voltage

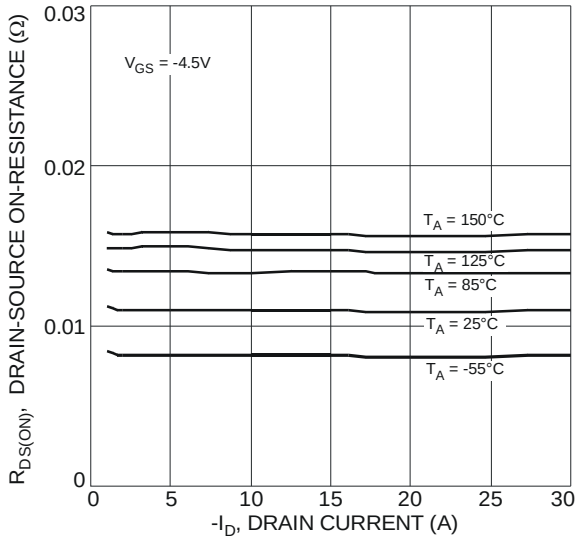


Fig. 4 Typical On-Resistance vs. Drain Current and Temperature

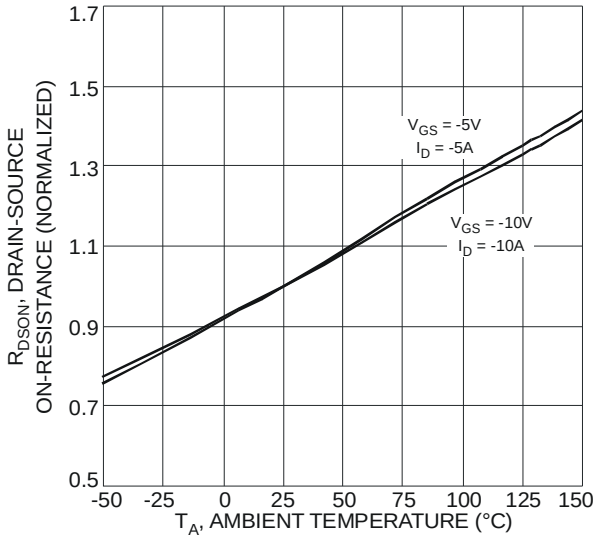


Fig. 5 On-Resistance Variation with Temperature

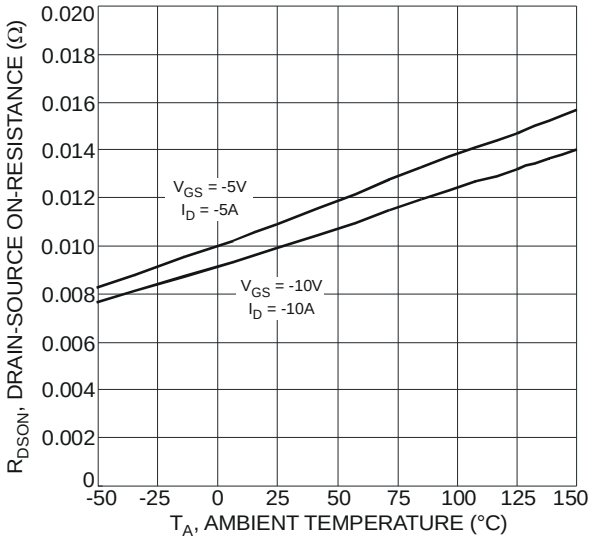


Fig. 6 On-Resistance Variation with Temperature

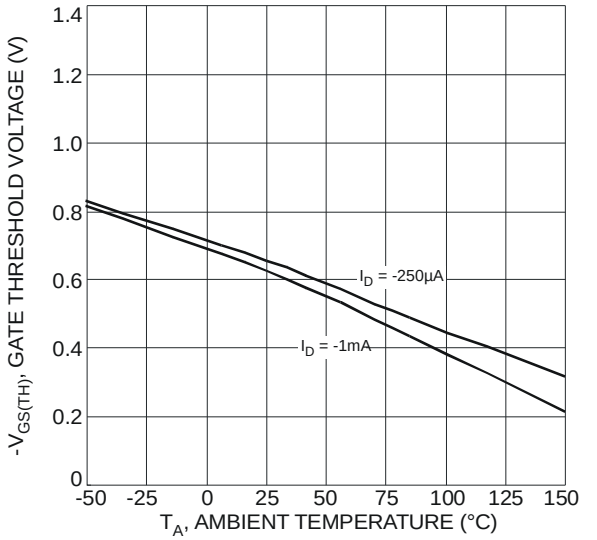


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

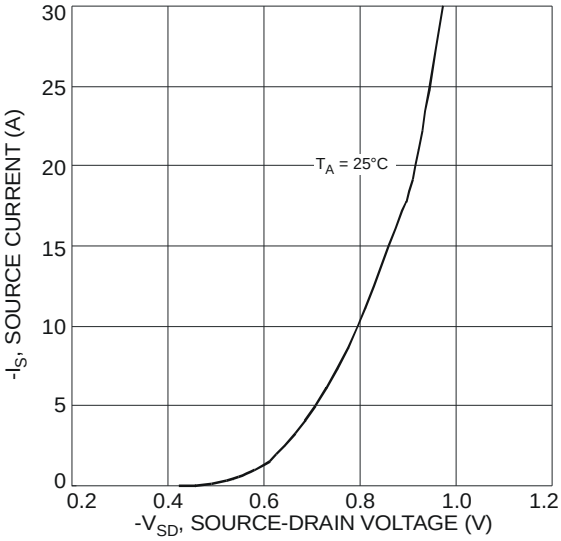


Fig. 8 Diode Forward Voltage vs. Current

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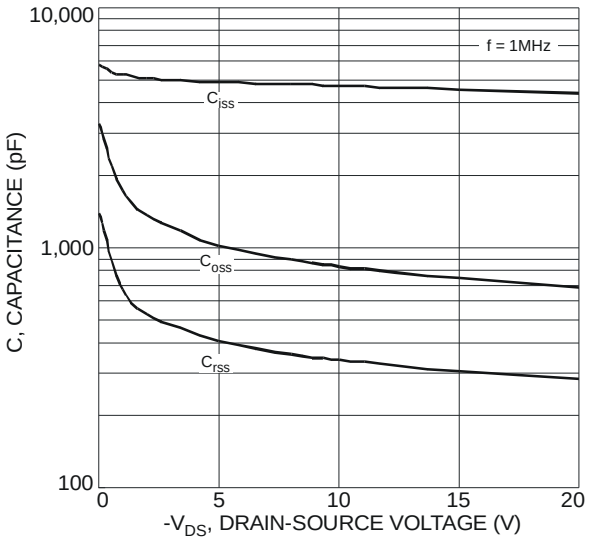


Fig. 9 Typical Total Capacitance

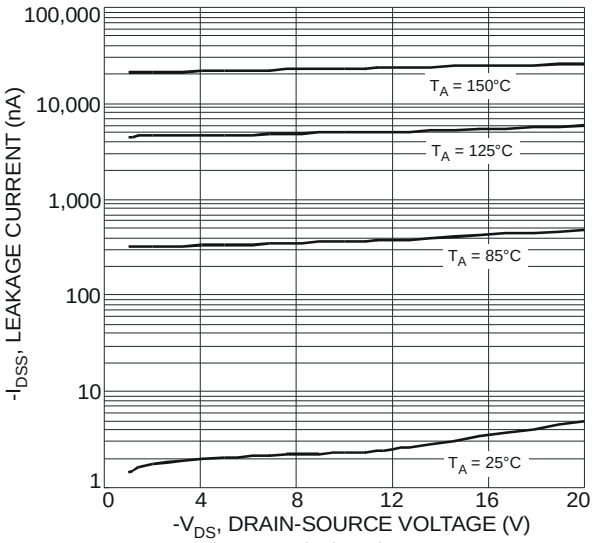


Fig. 10 Typical Leakage Current vs. Drain-Source Voltage

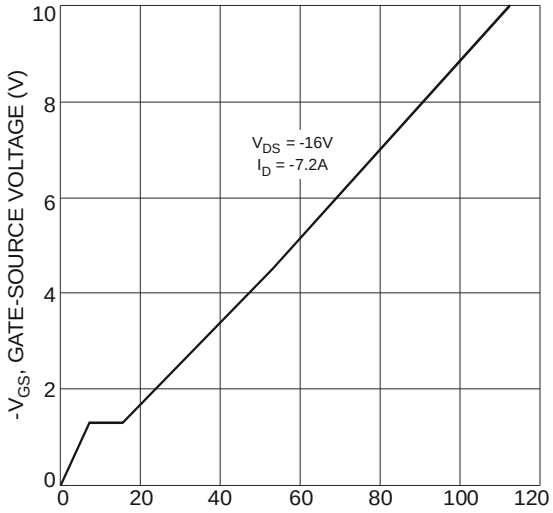


Fig. 11 Gate-Charge Characteristics

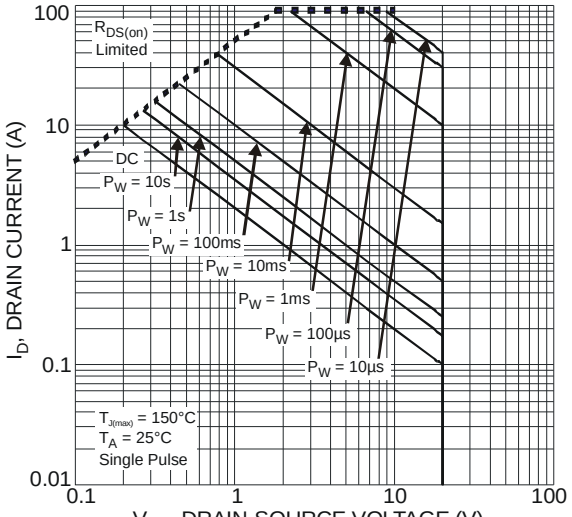


Fig. 12 Safe Operation Area

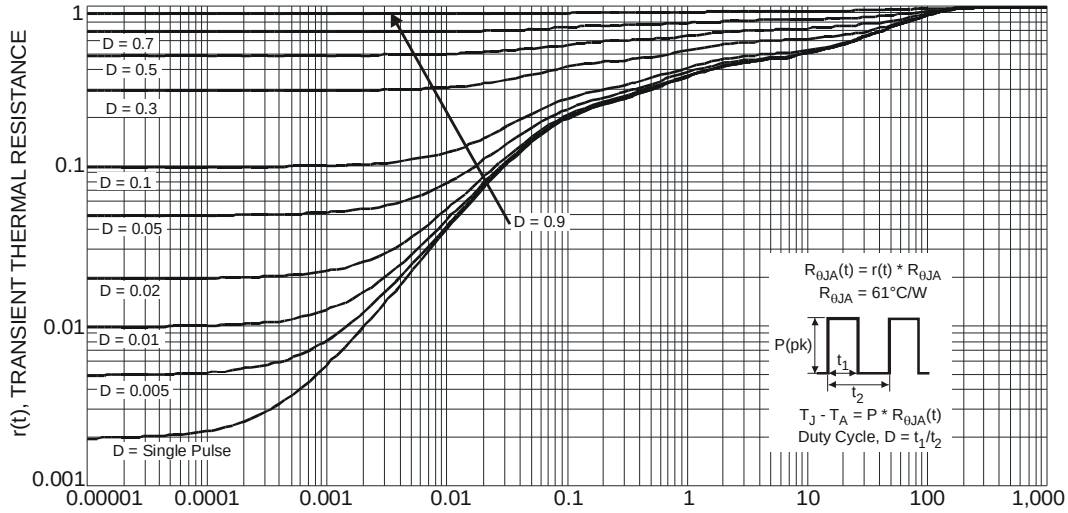
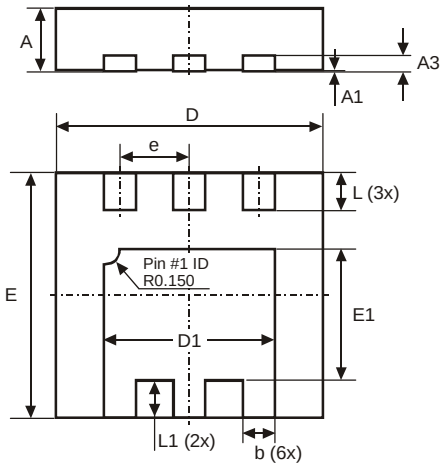


Fig. 13 Transient Thermal Response

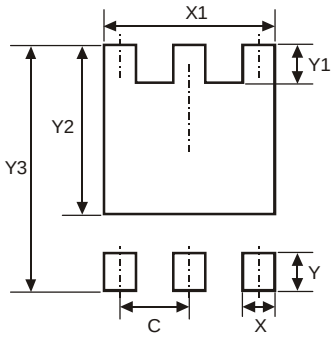
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Package Outline Dimensions



U-DFN2523-6			
Dim	**Min**	**Max**	**Typ**
A	0.57	0.63	0.60
A1	0	0.05	0.02
A3	–	–	0.152
b	0.25	0.35	0.30
D	2.45	2.55	2.50
D1	1.55	1.65	1.60
e	–	–	0.65
E	2.25	2.35	2.30
E1	1.18	1.28	1.23
L	0.30	0.40	0.35
L1	0.30	0.40	0.35
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
C	0.650
X	0.400
X1	1.700
Y	0.650
Y1	0.450
Y2	1.830
Y3	2.700

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