60V N-CHANNEL ENHANCEMENT MODE MOSFET H-BRIDGE

Product Summary

BV_{DSS}	$R_{DS(ON)}$	I_D T_A = +25°C
60V	22mΩ @ V_{GS} = 10V	10.6A
	30mΩ @ V_{GS} = 4.5V	8.7A

Features

- Thermally Efficient Package – Cooler Running Applications
- High Conversion Efficiency
- Low $R_{DS(ON)}$ – Minimizes On-State Losses
- Low Input Capacitance
- Fast Switching Speed
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Description

This new generation complementary MOSFET H-Bridge features low on-resistance achievable with low gate drive.

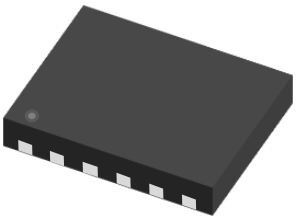
Mechanical Data

- Case: V-DFN5045-12 (Type B)
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections: See Diagram
- Terminals: Finish – Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.097 grams (Approximate)

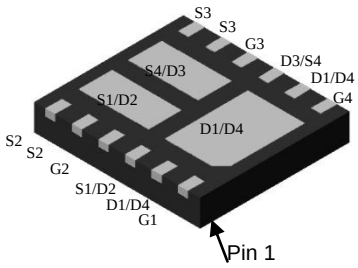
Applications

- Motor Control
- DC-DC Converters
- Power Management

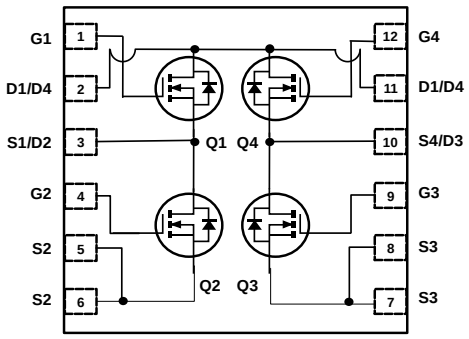
V-DFN5045-12 (Type B)



Top View



Bottom View



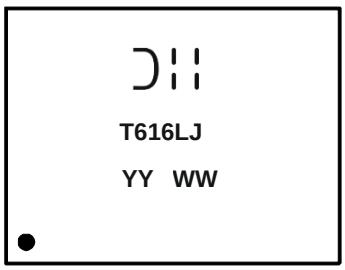
Internal Schematic

Ordering Information (Note 4)

Part Number	Case	Packaging
DMHT6016LFJ-13	V-DFN5045-12 (Type B)	3,000/Tape & Reel

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at http://www.diodes.com/products/packages.html.

Marking Information



=Manufacturer's Marking
T616LJ = Product Type Marking Code
YYWW = Date Code Marking
YY = Last Two Digits of Year (ex: 16 = 2016)
WW = Week Code (01 to 53)

Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	60	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 6) V_{GS} = 10V	Steady State	T_A = +25°C T_A = +70°C	I_D	10.6 8.5	A
	t<10s	T_A = +25°C T_A = +70°C	I_D	14.8 11.9	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	60	A
Maximum Continuous Body Diode Forward Current (Note 6)			I_S	2	A
Avalanche Current (Note 7) L=0.1mH			I_{AS}	15.3	A
Avalanche Energy (Note 7) L=0.1mH			E_{AS}	11.7	mJ

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)		P_D	1.16	W
Thermal Resistance, Junction to Ambient (Note 5)	Steady State	$R_{\theta JA}$	108	°C/W
	t<10s		56	
Total Power Dissipation (Note 6)		P_D	2.7	W
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	$R_{\theta JA}$	46	°C/W
	t<10s		24	
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	4.4	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 8)						
Drain-Source Breakdown Voltage	BV_{DSS}	60	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current	I_{DSS}	—	—	1	µA	V_{DS} = 48V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	$V_{GS(TH)}$	1	—	3	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	—	17	22	mΩ	V_{GS} = 10V, I_D = 10A
		—	22.2	30		V_{GS} = 4.5V, I_D = 6A
Diode Forward Voltage	V_{SD}	—	0.7	1.2	V	V_{GS} = 0V, I_S = 1A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C_{ISS}	—	864	—	pF	V_{DS} = 30V, V_{GS} = 0V, f = 1MHz
Output Capacitance	C_{OSS}	—	282	—		
Reverse Transfer Capacitance	C_{RSS}	—	27	—		
Gate Resistance	R_G	—	1.3	—	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge (V_{GS} = 4.5V)	Q_G	—	8.4	—	nC	V_{DS} = 30V, I_D = 10A
Total Gate Charge (V_{GS} = 10V)	Q_G	—	17	—		
Gate-Source Charge	Q_{GS}	—	3.1	—		
Gate-Drain Charge	Q_{GD}	—	4.3	—		
Turn-On Delay Time	$t_{D(ON)}$	—	3.4	—	ns	V_{GS} = 10V, V_{DS} = 30V, R_G = 6Ω, I_D = 10A
Turn-On Rise Time	t_R	—	5.2	—		
Turn-Off Delay Time	$t_{D(OFF)}$	—	13	—		
Turn-Off Fall Time	t_F	—	7	—		
Reverse Recovery Time	t_{RR}	—	22	—	ns	I_F = 10A, di/dt = 100A/µs
Reverse Recovery Charge	Q_{RR}	—	11	—	nC	

Notes:
5. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1-inch square copper plate.
7. I_{AS} and E_{AS} ratings are based on low frequency and duty cycles to keep T_J = +25°C.
8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to product testing.

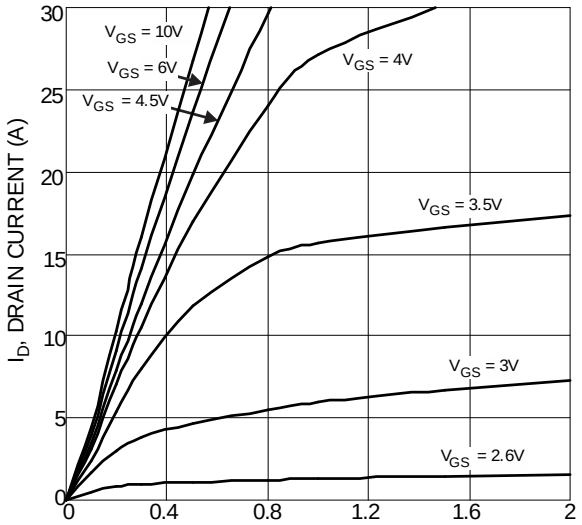


Figure 1 Typical Output Characteristic

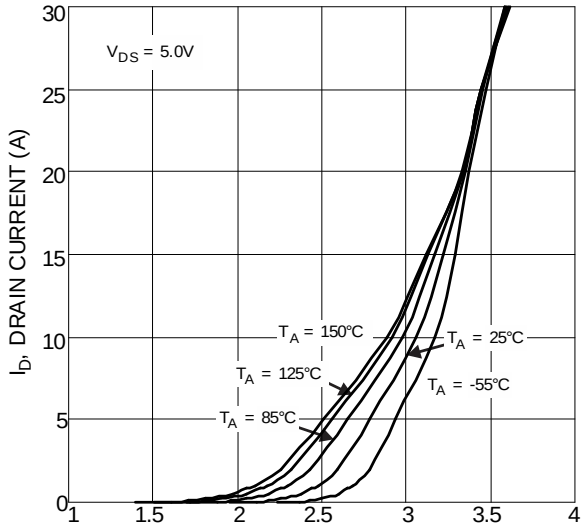


Figure 2 Typical Transfer Characteristics

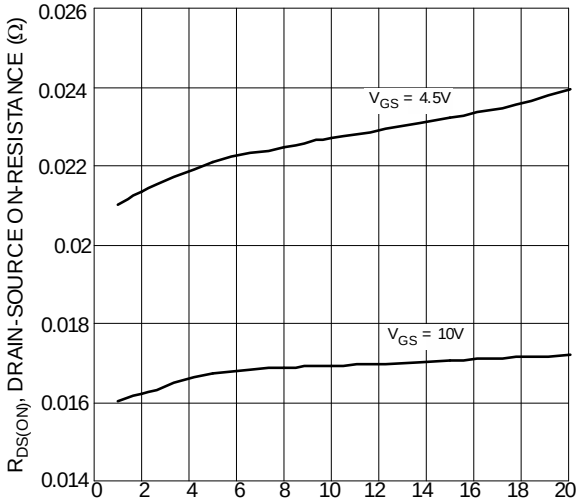


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

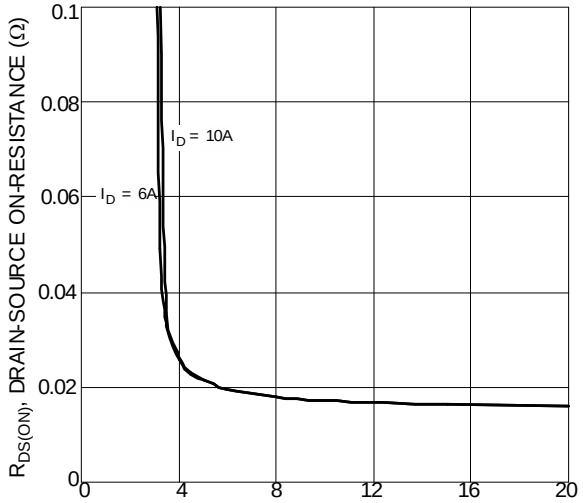


Figure 4 Typical Drain-Source On-Resistance vs. Gate-Source Voltage

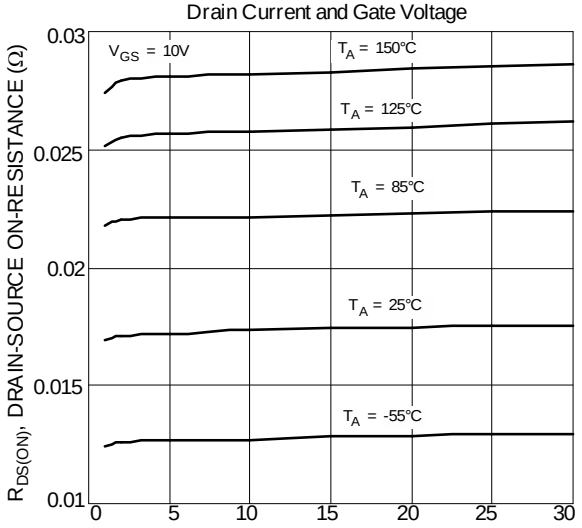


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

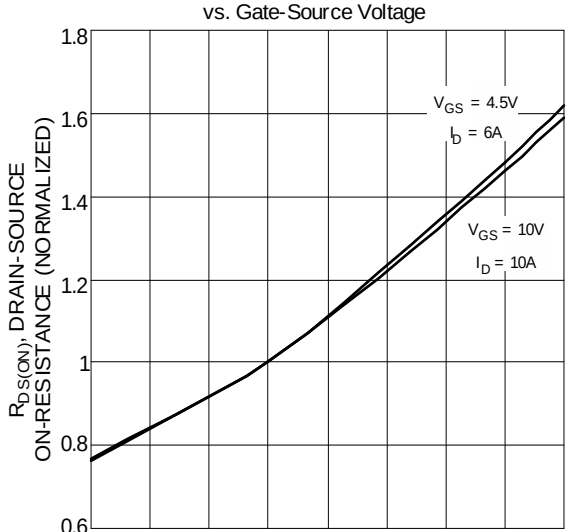


Figure 6 On-Resistance Variation with Temperature

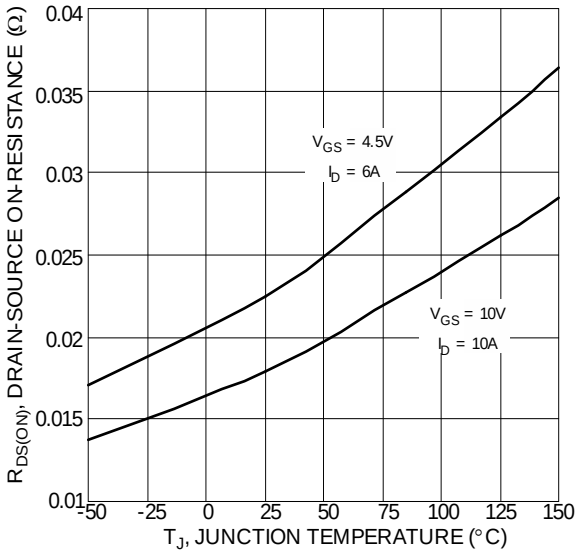


Figure 7 On-Resistance Variation with Temperature

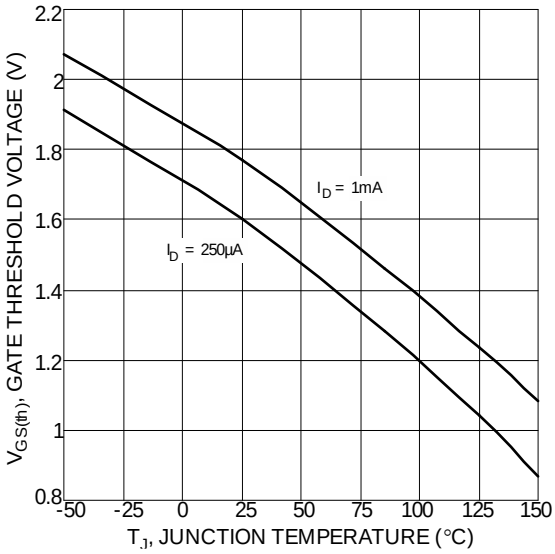


Figure 8 Gate Threshold Variation vs. Temperature

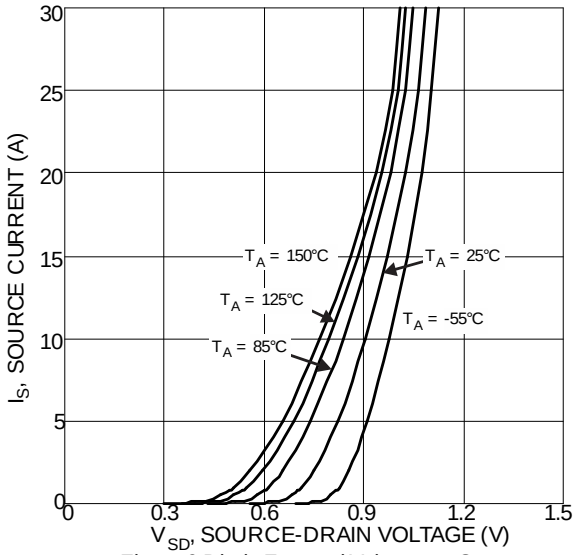


Figure 9 Diode Forward Voltage vs. Current

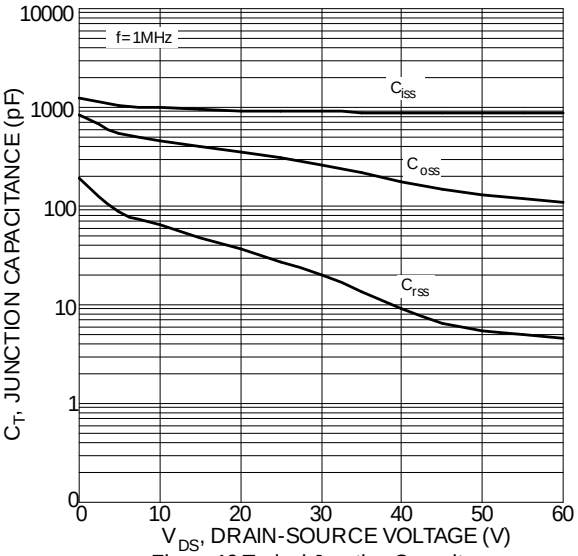


Figure 10 Typical Junction Capacitance

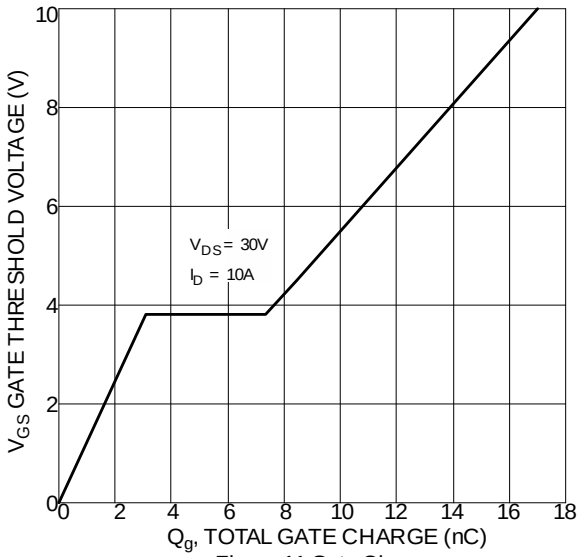


Figure 11 Gate Charge

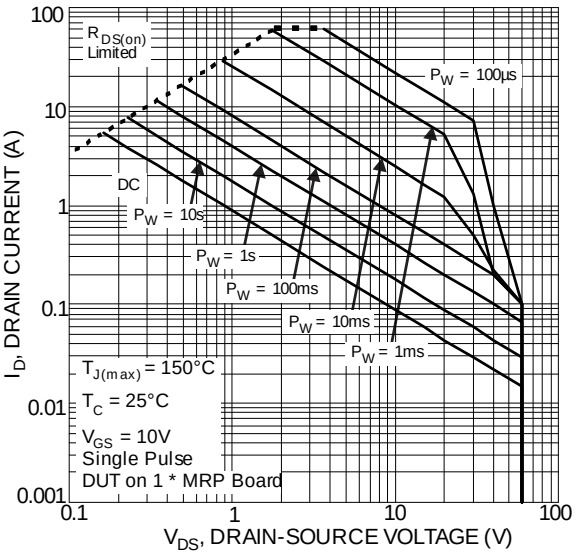


Figure 12 SOA, Safe Operation Area

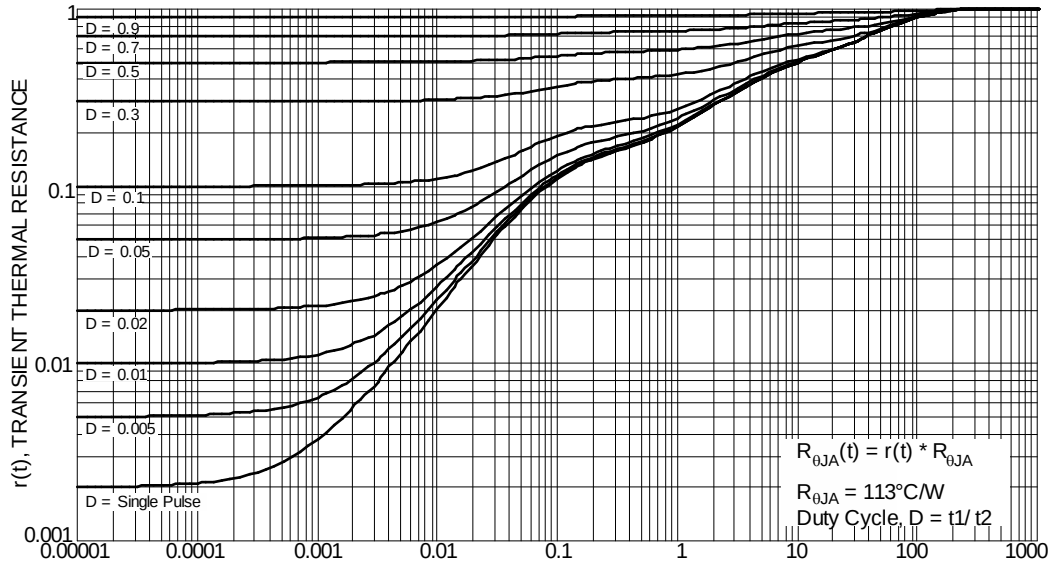
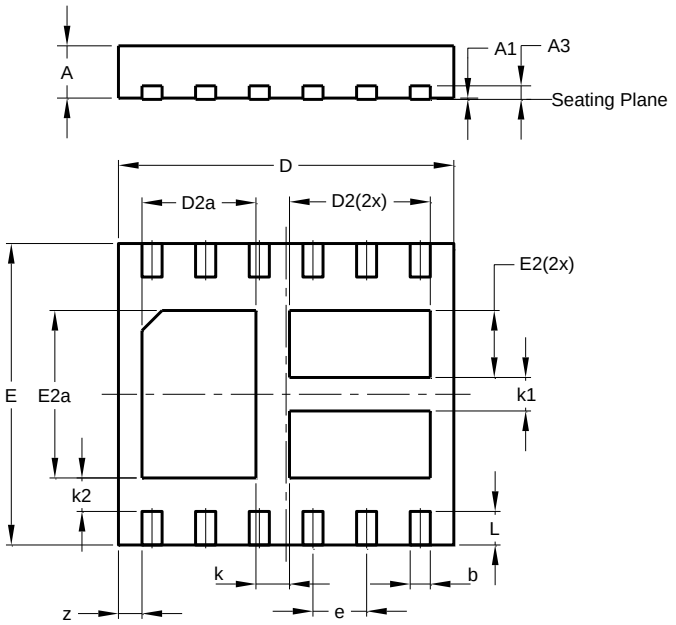


Figure 13 Transient Thermal Resistance

Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

V-DFN5045-12 (Type B)

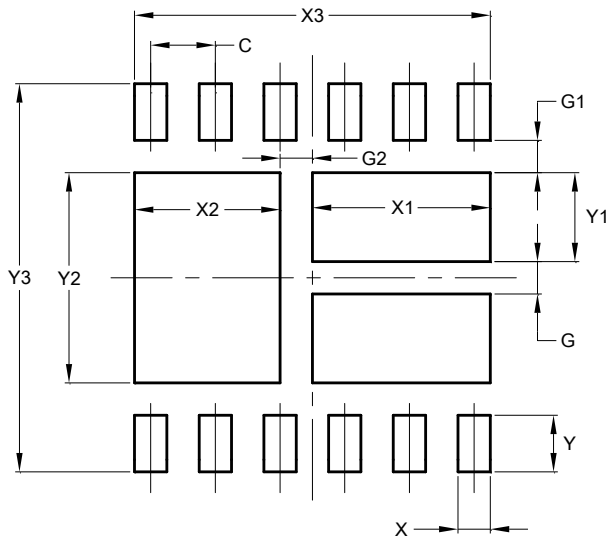


V-DFN5045-12 (Type B)			
Dim	**Min**	**Max**	**Typ**
A	0.75	0.85	0.80
A1	0.00	0.05	0.02
A3	–	–	0.203
b	0.25	0.35	0.30
D	4.95	5.05	5.00
D2	2.00	2.20	2.10
D2a	1.60	1.80	1.70
E	4.45	4.55	4.50
E2	0.90	1.10	1.00
E2a	2.40	2.60	2.50
e	–	–	0.80
k	–	–	0.50
k1	–	–	0.50
k2	–	–	0.50
L	0.45	0.55	0.50
z	–	–	0.35
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

V-DFN5045-12 (Type B)



Dimensions	Value (in mm)
C	0.800
G	0.40
G1	0.40
G2	0.40
X	0.40
X1	2.20
X2	1.80
X3	4.40
Y	0.700
Y1	1.100
Y2	2.600
Y3	4.800

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