12V P-CHANNEL ENHANCEMENT MODE MOSFET

Summary

$V_{(BR)DSS}$	$R_{DS(on)}$ max	I_D max
-12V	29mΩ @V_{GS} = -4.5V	-6.6 A
	45mΩ @V_{GS} = -2.5V	-5.3 A
	60mΩ @V_{GS} = -1.8V	-4.6 A
	100mΩ @V_{GS} = -1.5V	-3.5 A

Features and Benefits

- Typical off board profile of 0.5mm - ideally suited for thin applications
- Low $R_{DS(ON)}$ – minimizes conduction losses
- PCB footprint of 2.56mm^2
- **3kV ESD Protected Gate – protected against human borne ESD**
- **"Lead-Free", RoHS Compliant (Note 1)**
- **"Green" Device (Note 2)**

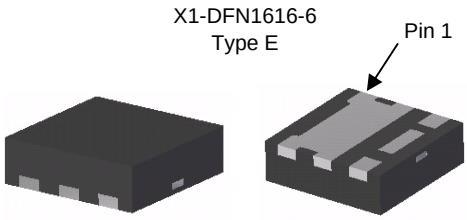
Application

This device provides a high performance, low $R_{DS(ON)}$ P channel MOSFETs in the thermally and space efficient X1-DFN1616-6 package. The low $R_{DS(ON)}$ of this MOSFET ensures conduction losses are kept making it ideal for use as a:

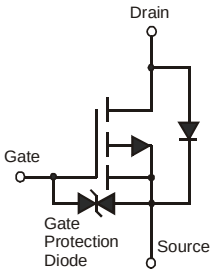
- Battery disconnect switch
- Load switch for power management functions

Mechanical Data

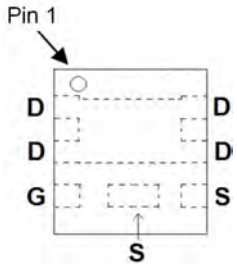
- Case: X1-DFN1616-6 Type E
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Lead Free Plating (NiPdAu Finish over Copper leadframe).
- Terminals: Solderable per MIL-STD-202, Method 208
- Weight: 0.04 grams (approximate)



Top View Bottom View



Device symbol



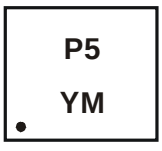
Top View
Pin-Out

Ordering Information (Note 3)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
DMP1245UFCL-7	P5	7	8	3,000

Notes:
1. No purposefully added lead.
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



P5 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: X = 2010)
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

Maximum Ratings @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Value	Units
Drain-Source Voltage		V_{DSS}	-12	V
Gate-Source Voltage		V_{GSS}	±8	V
Continuous Drain Current (Note 5)	@T_A = 25°C @T_A = 70°C	I_D	-6.6 -5.25	A
Pulsed Drain Current	T_P = 10µs	I_{DM}	-16.67	A

Thermal Characteristics @T_A = 25°C unless otherwise specified

Characteristic		Symbol	Value	Units
Total Power Dissipation	(Note 4)	P_D	613	mW
	(Note 5)		1.7	W
Thermal Resistance, Junction to Ambient	(Note 4)	$R_{\theta JA}$	204	°C/W
	(Note 5)		74	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

Notes:
4. For a device surface mounted on minimum recommended pad layout, in still air conditions; the device is measured when operating in a steady state condition.
5. For a device surface mounted on 25mm by 25mm by 1.6mm FR4 PCB with high coverage of single sided 2oz copper, in still air conditions; the device is measured when operating in a steady state condition.

Thermal Characteristics

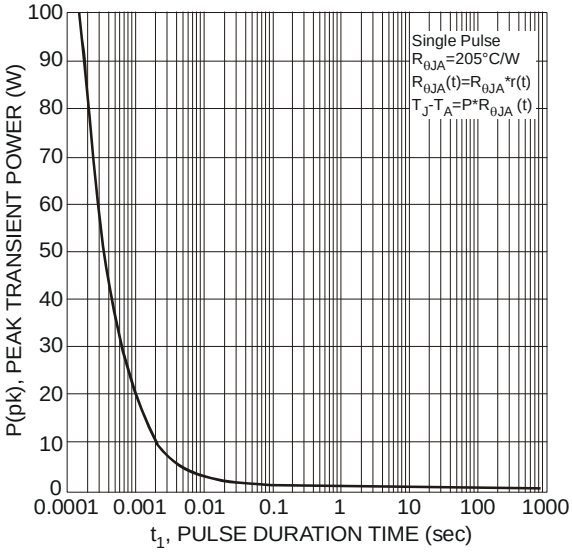


Fig. 1 Single Pulse Maximum Power Dissipation

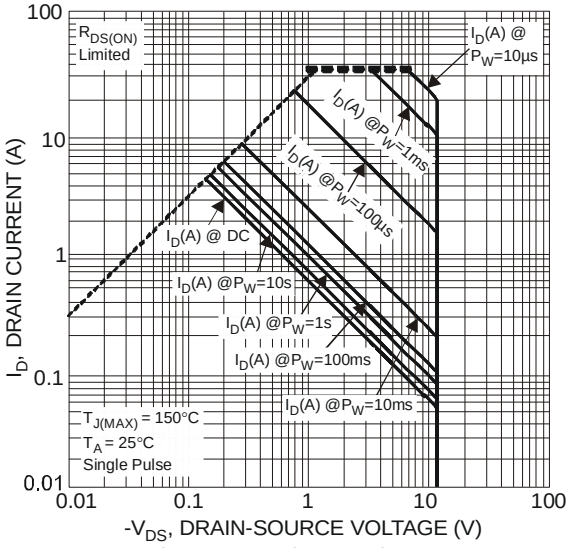


Fig. 2 SOA, Safe Operation Area

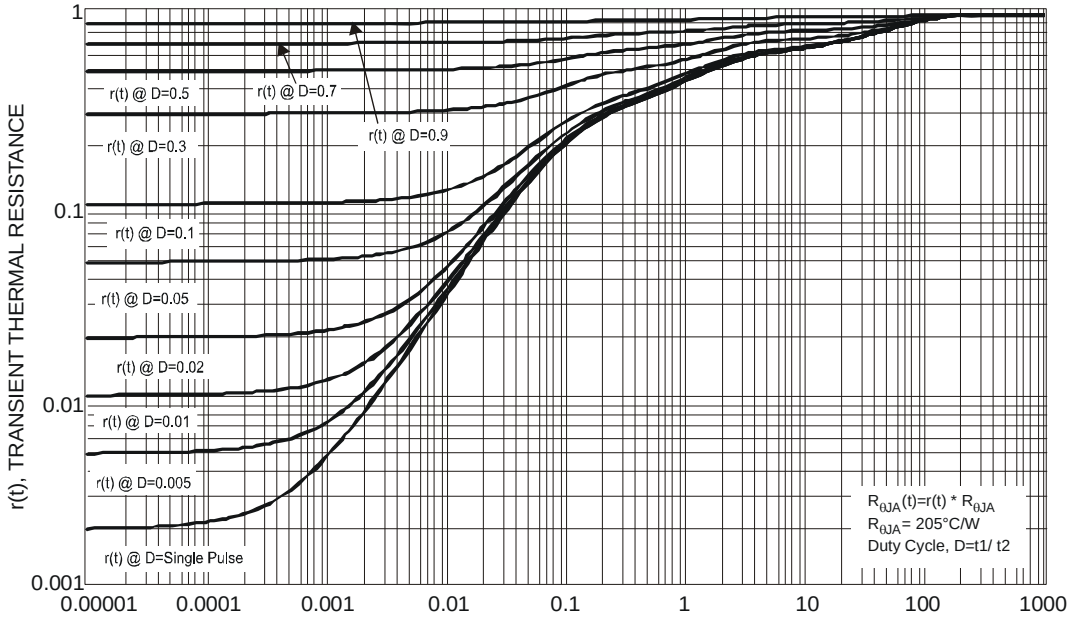


Fig. 03 Transient Thermal Resistance

Electrical Characteristics @T_A = 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)						
Drain-Source Breakdown Voltage	BV_{DSS}	-12	—	—	V	V_{GS} = 0V, I_D = -250µA
Zero Gate Voltage Drain Current T_J = 25°C	I_{DSS}	—	—	-1	µA	V_{DS} = -12.0V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	—	—	±10	µA	V_{GS} = ±8.0V, V_{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Threshold Voltage	$V_{GS(th)}$	-0.3	-0.6	-0.95	V	V_{DS} = V_{GS}, I_D = -250µA
Static Drain-Source On-Resistance	$R_{DS\ (ON)}$	—	25	29	mΩ	V_{GS} = -4.5V, I_D = - 4A
		—	31	45		V_{GS} = -2.5V, I_D = - 3.5A
		—	40	60		V_{GS} = -1.8V, I_D = - 1A
		—	60	100		V_{GS} = -1.5 V, I_D = - 0.5A
Forward Transfer Admittance	$\|Y_{fs}\|$	0.4	3	-	S	V_{DS} = -5V, I_D = -2A
Diode Forward Voltage	V_{SD}	-	-	-1.0	V	V_{GS} = 0V, I_D = -2A
DYNAMIC CHARACTERISTICS (Note 7)						
Input Capacitance	C_{iss}	-	1357.4	-	pF	V_{DS} = -10V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{oss}	-	499	-	pF	
Reverse Transfer Capacitance	C_{rss}	-	273.6	-	pF	
Gate Resistance	R_g	-	14.26	-	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge	Q_g	-	16.1	-	nC	V_{GS} = -4.5V; I_D = -1A, V_{DS} = -10V
		-	26.1	-	nC	V_{GS} = -8V; I_D = -1A, V_{DS} = -10V
Gate-Source Charge	Q_{gs}	-	1.71	-	nC	V_{GS} = -8V; I_D = -1A, V_{DS} = -10V
Gate-Drain Charge	Q_{gd}	-	20.48	-	nC	V_{GS} = -8V; I_D = -1A, V_{DS} = -10V
Turn-On Delay Time	$t_{D(on)}$	-	15.2	-	ns	V_{GS} = -2.5V, V_{DS} = -10V I_D = -180mA, R_G = 2.0Ω,
Turn-On Rise Time	t_r	-	33.11	-	ns	
Turn-Off Delay Time	$t_{D(off)}$	-	219.4	-	ns	
Turn-Off Fall Time	t_f	-	217.64	-	ns	

Notes: 6. Short duration pulse test used to minimize self-heating effect.
7. Guaranteed by design. Not subject to production testing.

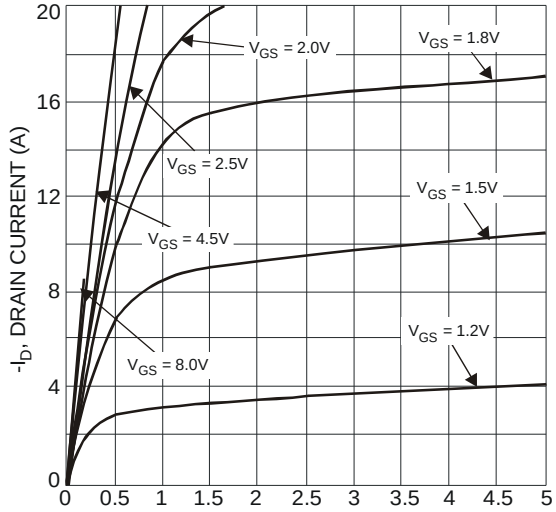


Fig. 4 Typical Output Characteristics

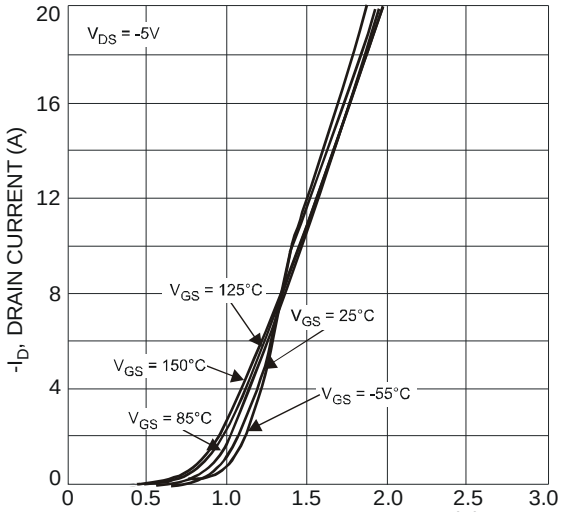


Fig. 5 Typical Transfer Characteristic

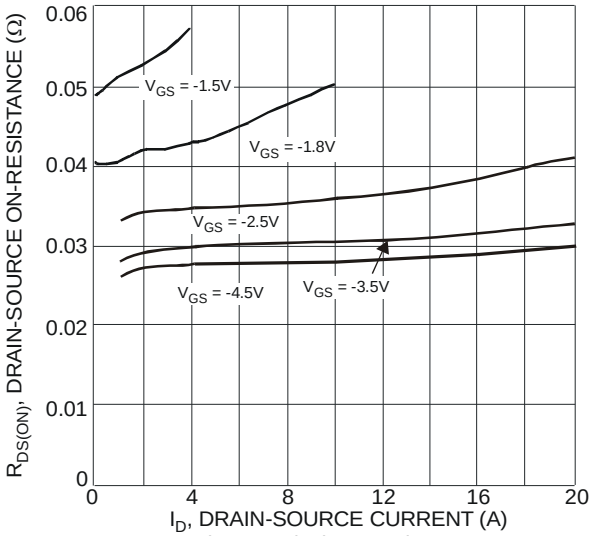


Fig. 6 Typical On-Resistance
vs. Drain Current and Gate Voltage

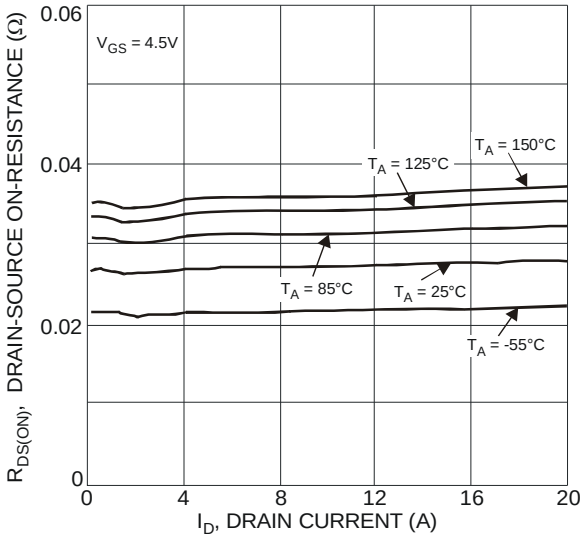


Fig. 7 Typical On-Resistance
vs. Drain Current and Temperature

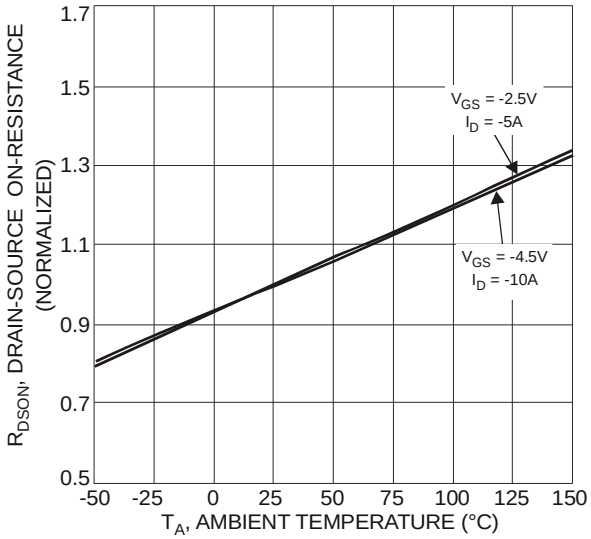


Fig. 8 On-Resistance Variation with Temperature

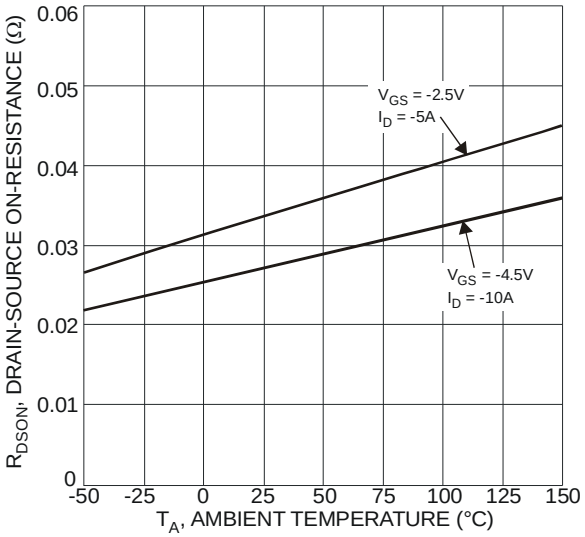


Fig. 9 On-Resistance Variation with Temperature

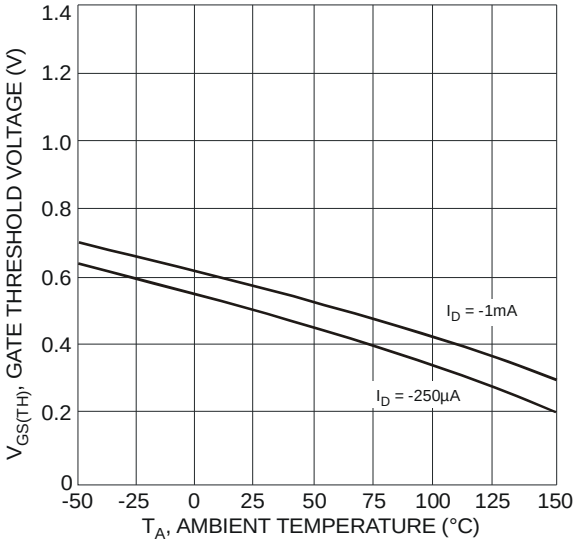


Fig. 10 Gate Threshold Variation vs. Ambient Temperature

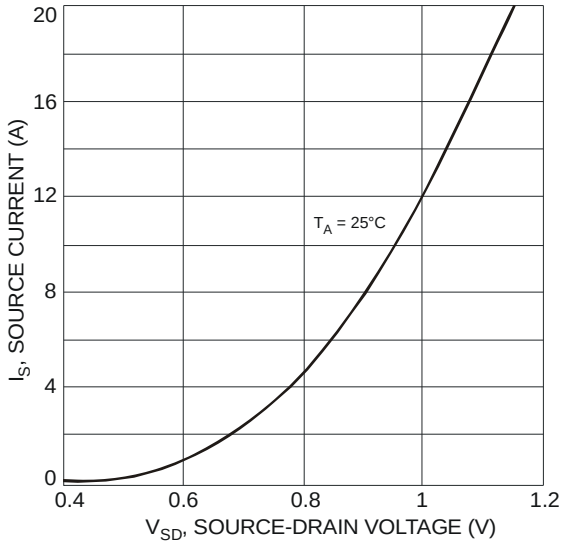


Fig. 11 Diode Forward Voltage vs. Current

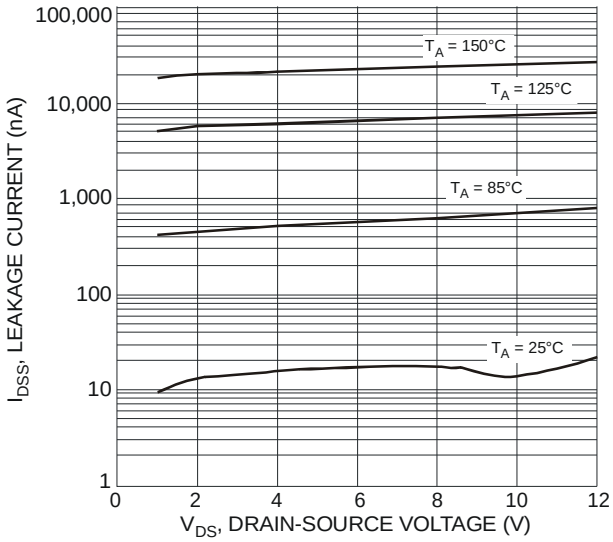


Fig. 12 Typical Drain-Source Leakage Current vs. Voltage

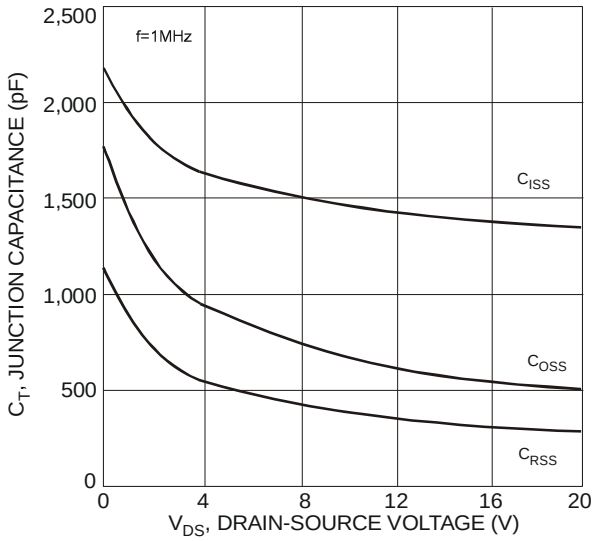


Fig. 13 Typical Junction Capacitance

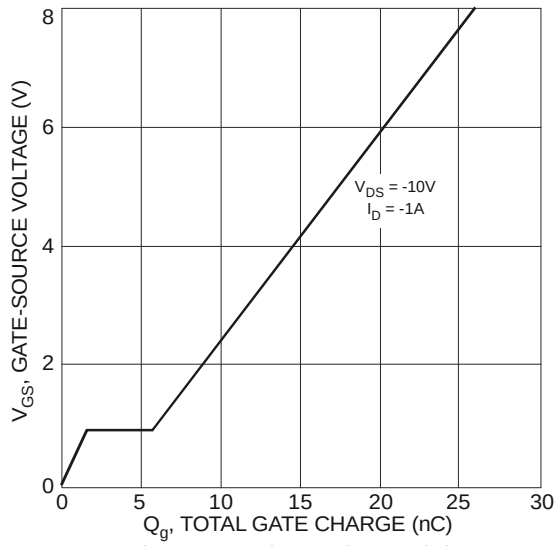
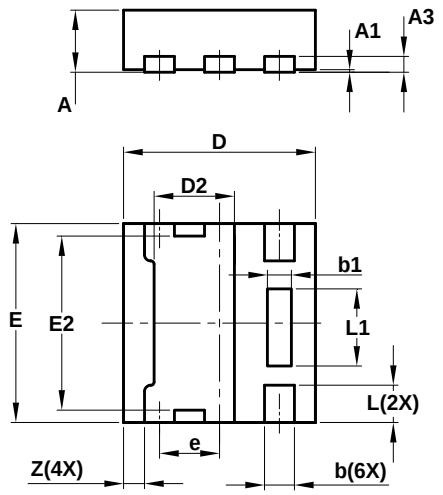


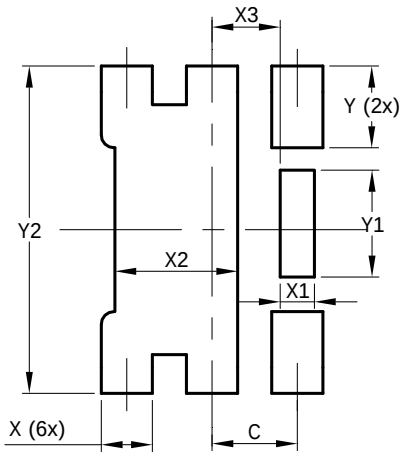
Fig. 14 Gate-Charge Characteristics

Package Outline Dimensions



X1-DFN1616-6 Type E			
Dim	**Min**	**Max**	**Typ**
A	0.47	0.53	0.50
A1	0	0.05	0.02
A3	—	—	0.13
b	0.20	0.30	0.25
b1	0.10	0.30	0.20
D	1.55	1.65	1.60
D2	0.57	0.77	0.67
E	1.55	1.65	1.60
E2	1.30	1.50	1.40
e	—	—	0.50
L	0.25	0.35	0.30
L1	0.52	0.72	0.62
Z	—	—	0.175
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
C	0.500
X	0.300
X1	0.200
X2	0.720
X3	0.400
Y	0.475
Y1	0.620
Y2	1.900

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