

Product Summary

BV _{DSS}	R _{DS(ON)} Max	I _D Max T _A = +25°C
-12V	16mΩ @ V _{GS} = -4.5V	-9.1A
	21.5mΩ @ V _{GS} = -2.5V	-7.9A
	26mΩ @ V _{GS} = -1.8V	-7.0A
	32mΩ @ V _{GS} = -1.5V	-6.3A

Description and Applications

This MOSFET is designed to meet the stringent requirements of Automotive applications. It is qualified to AEC-Q101, supported by a PPAP and is ideal for use in:

- Engine Management Systems
- DC-DC Converters
- Body Control Electronics

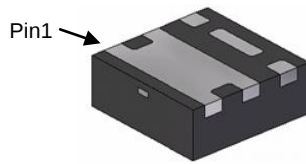
Features

- 0.6mm Profile – Ideal For Low Profile Applications
- PCB Footprint of 4mm²
- Low Gate Threshold Voltage
- Fast Switching Speed
- ESD Protected to 3kV
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

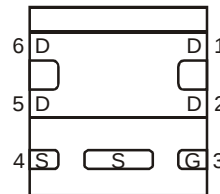
Mechanical Data

- Case: U-DFN2020-6 (Type E)
- 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 ^(e4)
- Weight: 0.0065 grams (Approximate)

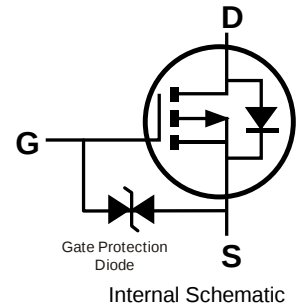
U-DFN2020-6 (Type E)



Bottom View



Pin Out
Bottom View

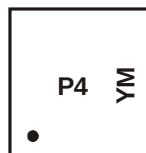


Ordering Information (Note 5)

Part Number	Marking	Reel Size (inches)	Quantity Per Reel
DMP1022UFDEQ-7	P4	7	3,000

- 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to <https://www.diodes.com/quality/product-compliance-definitions/>.
 5. For packaging details, go to our website at <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



P4 = Product Type Marking Code
YM = Date Code Marking
Y = Year (ex: E = 2017)
M = Month (ex: 9 = September)

Date Code Key

Date Code Key

Year	2011	~	2015	2016	2017	2018	2019	2020	2021	2022	2023
Code	Y	~	C	D	E	F	G	H	I	J	K

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	Unit
Drain-Source Voltage			V _{DSS}	-12	V
Gate-Source Voltage			V _{GSS}	±8	V
Continuous Drain Current (Note 7) V _{GS} = -4.5V	Steady State	T _A = +25°C T _A = +70°C	I _D	-9.1 -7.2	A
	t < 5s	T _A = +25°C T _A = +70°C	I _D	-11.2 -9.0	A
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I _{DM}	-90	A
Continuous Source-Drain Diode Current		T _A = +25°C	I _S	-2.5	A
		T _C = +25°C	I _S	-7.1	A
Pulsed Source-Drain Diode Current (10µs Pulse, Duty Cycle = 1%)			I _{SM}	-50	A

Thermal Characteristics

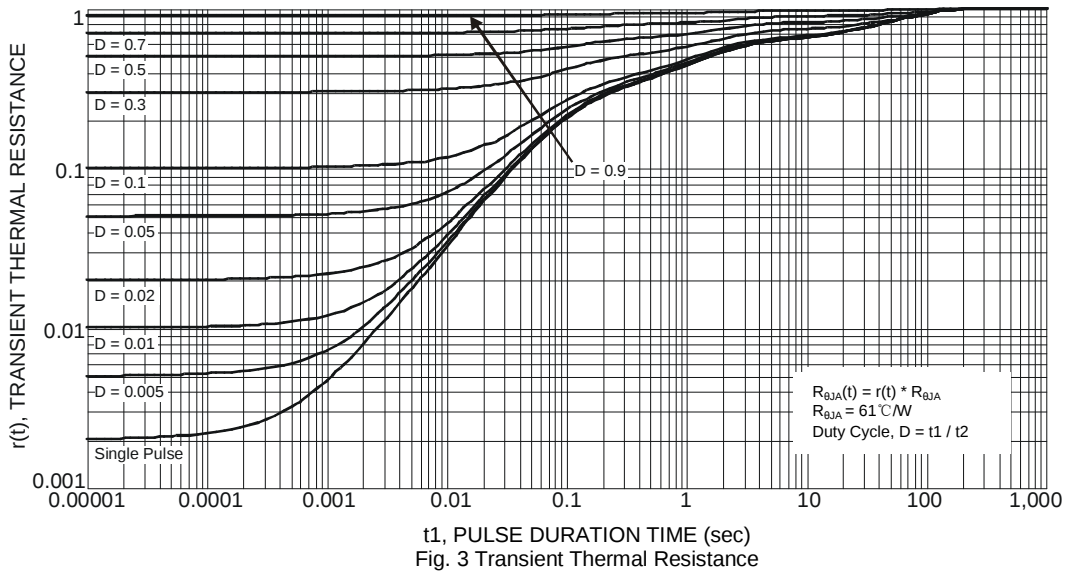
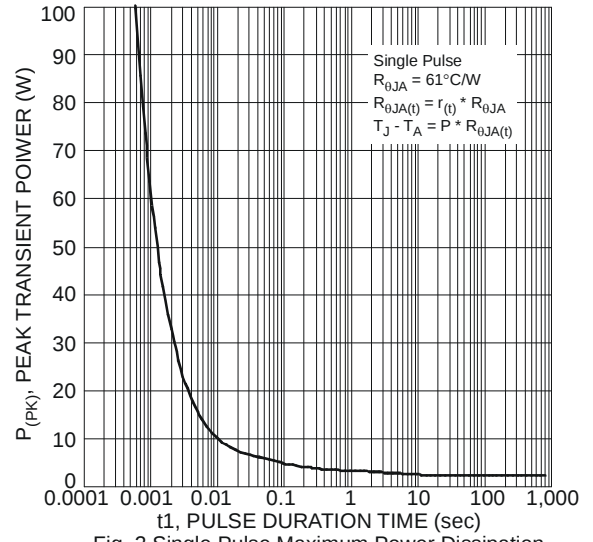
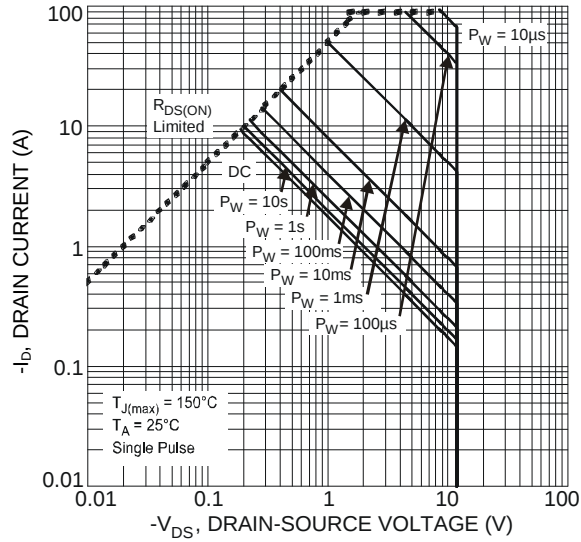
Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 6)	T _A = +25°C	P _D	0.66	W
	T _A = +70°C		0.42	
Thermal Resistance, Junction to Ambient (Note 6)	Steady State	R _{θJA}	189	°C/W
	t < 5s		123	
Total Power Dissipation (Note 7)	T _A = +25°C	P _D	2.03	W
	T _A = +70°C		1.3	
Thermal Resistance, Junction to Ambient (Note 7)	Steady State	R _{θJA}	61	°C/W
	t < 5s		40	
Thermal Resistance, Junction to Case (Note 6)	Steady State	R _{θJC}	9.3	
Operating and Storage Temperature Range		T _J , T _{STG}	-55 to +150	°C

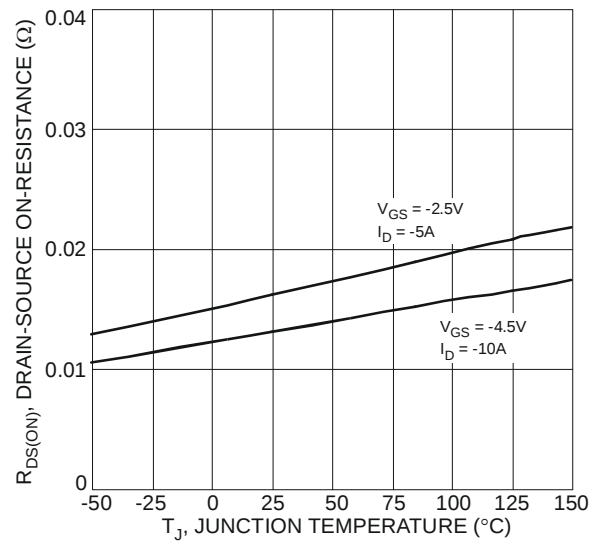
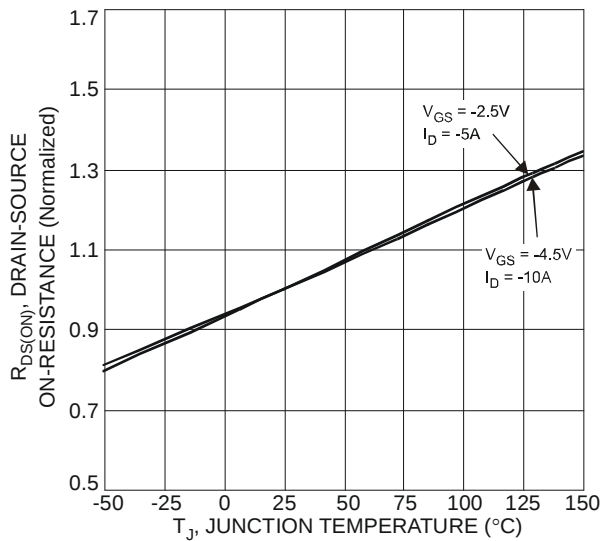
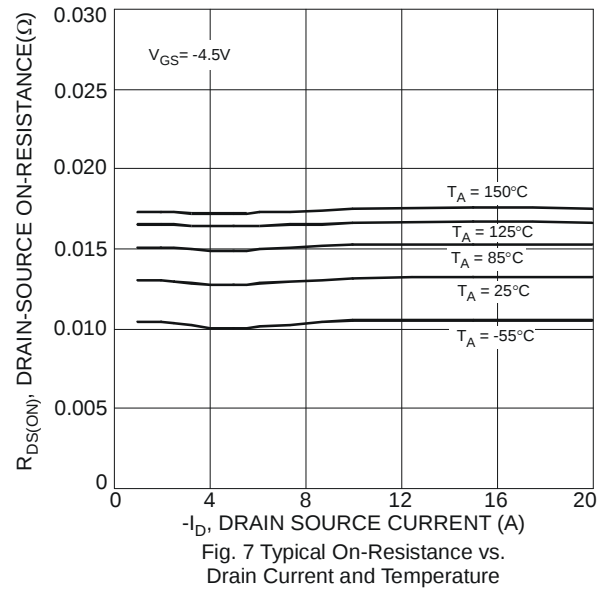
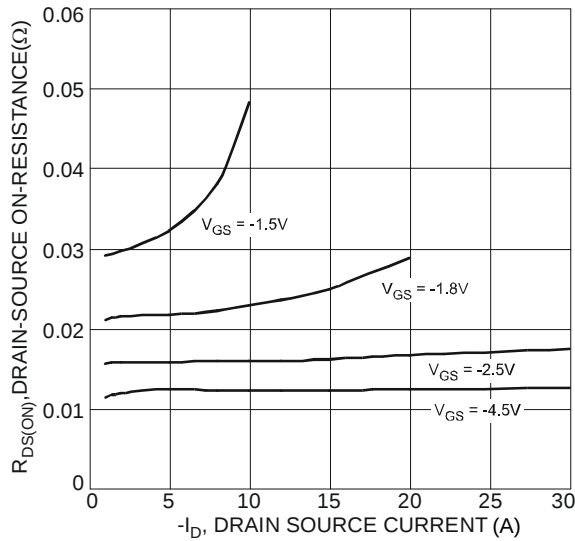
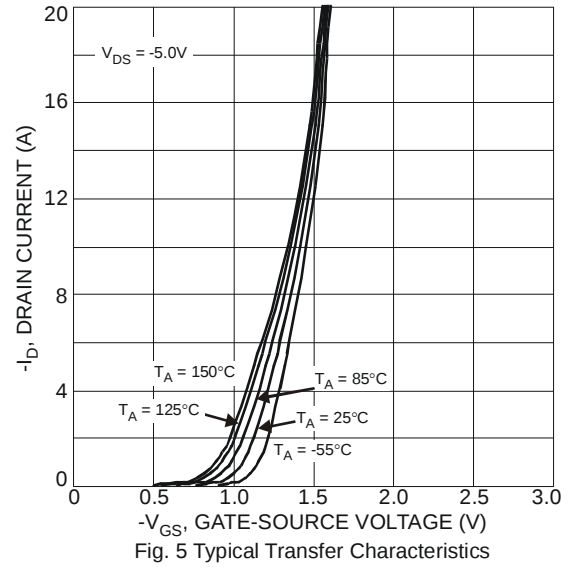
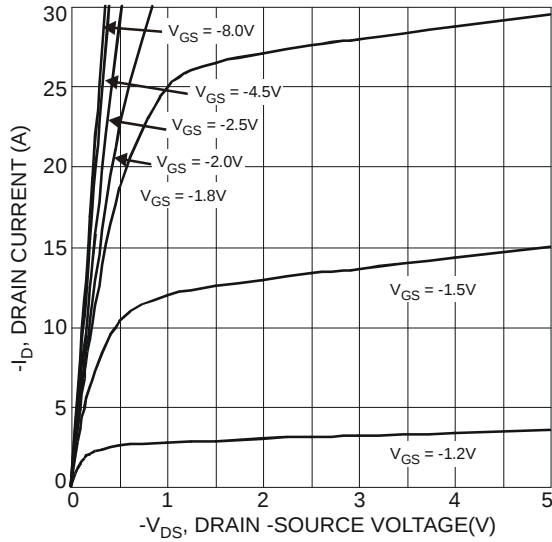
Notes: 6. Device mounted on FR-4 PC board, with minimum recommended pad layout, single sided.
7. Device mounted on FR-4 substrate PC board, 2oz copper, with thermal vias to bottom layer 1-inch square copper plate.

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}	-12	—	—	V	V _{GS} = 0V, I _D = -250μA
Zero Gate Voltage Drain Current (T _J = +25°C)	I _{DSS}	—	—	-3.5	μA	V _{DS} = -12V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±10	μA	V _{GS} = ±5V, V _{DS} = 0V
ON CHARACTERISTICS (Note 8)						
Gate Threshold Voltage	V _{GS(TH)}	-0.35	—	-0.8	V	V _{DS} = V _{GS} , I _D = -250μA
V _{GS(TH)} Temperature Coefficient	ΔV _{GS(TH)} /ΔT _J	—	2.5	—	mV/°C	I _D = -250μA
On-State Drain Current	I _{D(ON)}	-10	—	—	A	V _{GS} = -4.5V, V _{DS} < -5A
Static Drain-Source On-Resistance	R _{DS(ON)}	—	12	16	mΩ	V _{GS} = -4.5V, I _D = -8.2A
			15	21.5		V _{GS} = -2.5V, I _D = -7.2A
			20	26		V _{GS} = -1.8V, I _D = -6.6A
			23	32		V _{GS} = -1.5V, I _D = -1A
			80	160		V _{GS} = -1.2V, I _D = -1A
Forward Transfer Admittance	Y _{fs}	—	12	—	S	V _{DS} = -4V, I _D = -8.2A
Diode Forward Voltage	V _{SD}	—	-0.8	-1.2	V	V _{GS} = 0V, I _S = -8A
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iSS}	—	2,953	—	pF	V _{DS} = -4V, V _{GS} = 0V, f = 1.0MHz
Output Capacitance	C _{oSS}	—	756	—		
Reverse Transfer Capacitance	C _{rSS}	—	678	—		
Gate Resistance	R _g	—	8.6	18	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1MHz
Total Gate Charge	Q _g	—	28.4	42.6	nC	V _{GS} = -5V, V _{DS} = -4V, I _D = -10A
Total Gate Charge	Q _g	—	25.3	38		V _{GS} = -4.5V, V _{DS} = -4V, I _D = -10A
Gate-Source Charge	Q _{gs}	—	2.3	—		
Gate-Drain Charge	Q _{gd}	—	7.2	—		
Turn-On Delay Time	t _{D(ON)}	—	20	30	ns	V _{DS} = -4V, V _{GS} = -4.5V, R _G = 1Ω, R _L = 0.4Ω, I _D = -9.8A
Turn-On Rise Time	t _r	—	28	42		
Turn-Off Delay Time	t _{D(OFF)}	—	117	176		
Turn-Off Fall Time	t _f	—	93	139		
BODY DIODE CHARACTERISTICS						
Diode Forward Voltage	V _{SD}	—	-0.8	-1.2	V	V _{GS} = 0V, I _S = -9.8A
Continuous Source-Drain Diode Current (Note 6)	I _S	—	—	-2.5	A	T _A = +25°C
		—	—	-7.1		T _C = +25°C
Pulse Diode Forward Current (Note 8)	I _{SM}	—	—	-50		—
Body Diode Reverse Recovery Time (Note 8)	t _{RR}	—	28	56	ns	I _S = -9.8A, dI/dt = 100A/μs
Reverse Recovery Fall Time	t _a	—	10	—		
Reverse Recovery Rise Time	t _b	—	18	—		
Body Diode Reverse Recovery Charge (Note 8)	Q _{RR}	—	13	26	nC	

Notes: 8. Short duration pulse test used to minimize self-heating effect.
9. Guaranteed by design. Not subject to production testing.





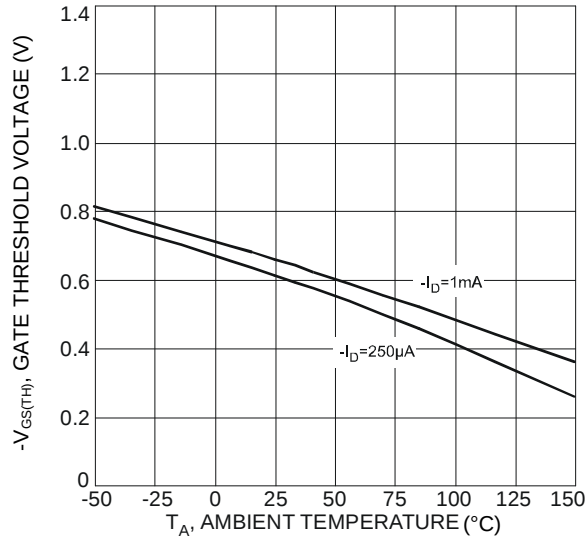


Fig. 10 Gate Threshold Variation vs. Ambient Temperature

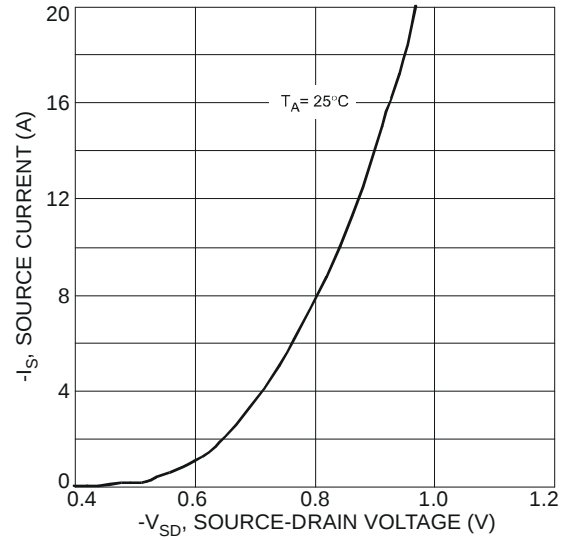


Fig. 11 Diode Forward Voltage vs. Current

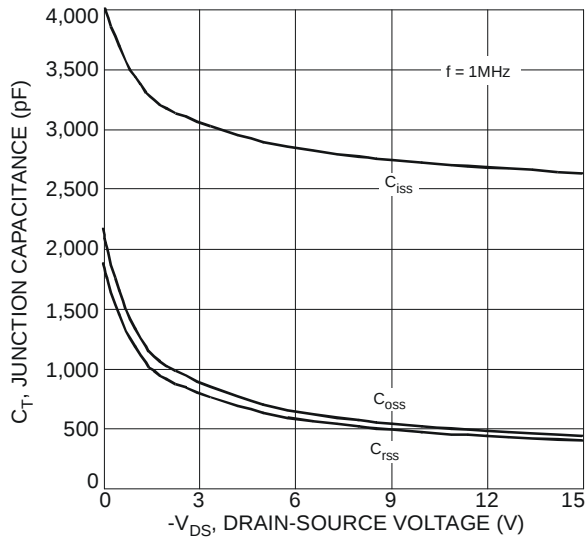


Fig. 12 Typical Junction Capacitance

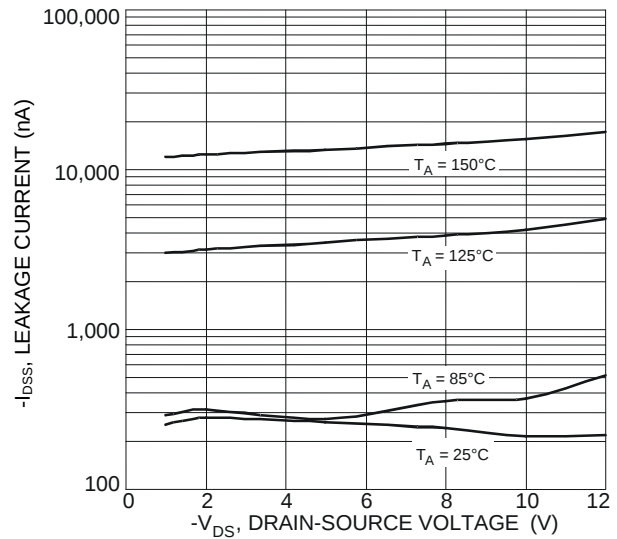


Fig. 13 Typical Drain-Source Leakage Current vs. Voltage

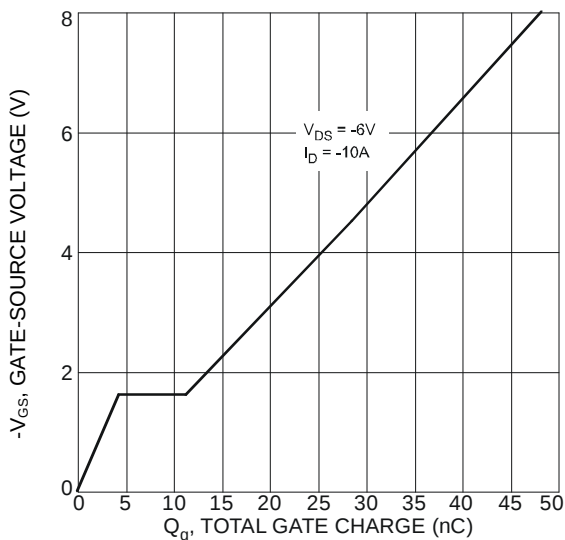
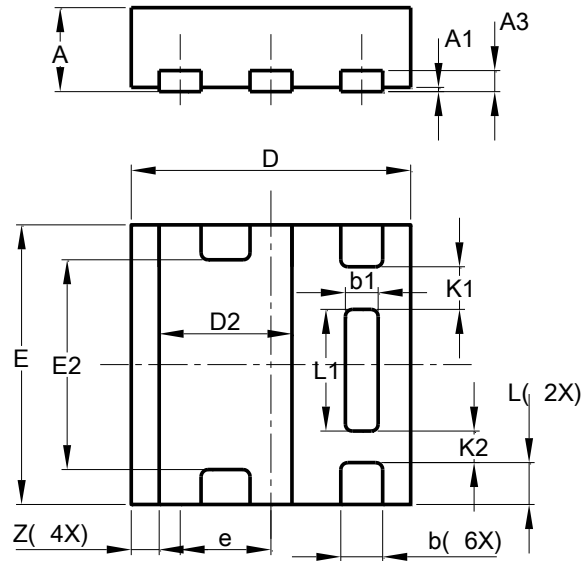


Fig. 14 Gate-Charge Characteristics

Package Outline Dimensions

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

U-DFN2020-6 (Type E)

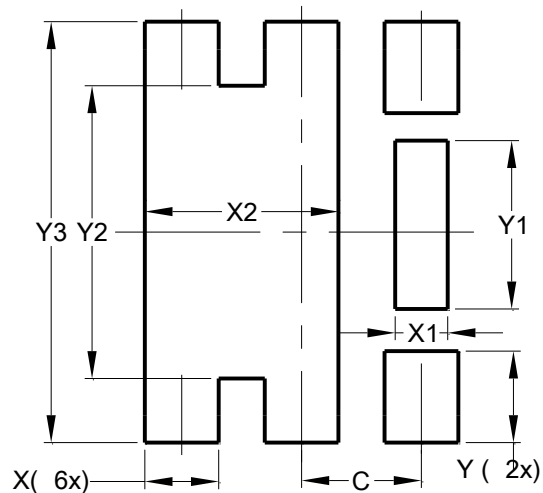


U-DFN2020-6 (Type E)			
Dim	Min	Max	Typ
A	0.57	0.63	0.60
A1	0	0.05	0.03
A3	—	—	0.15
b	0.25	0.35	0.30
b1	0.185	0.285	0.235
D	1.95	2.05	2.00
D2	0.85	1.05	0.95
E	1.95	2.05	2.00
E2	1.40	1.60	1.50
e	—	—	0.65
L	0.25	0.35	0.30
L1	0.82	0.92	0.87
K1	—	—	0.305
K2	—	—	0.225
Z	—	—	0.20
All Dimensions in mm			

Suggested Pad Layout

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

U-DFN2020-6 (Type E)



Dimensions	Value (in mm)
C	0.650
X	0.400
X1	0.285
X2	1.050
Y	0.500
Y1	0.920
Y2	1.600
Y3	2.300

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