

## Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	$I_D$ max $T_A = +25^\circ C$
100V	160m $\Omega$ @ $V_{GS} = 10V$	2.9A
	200m $\Omega$ @ $V_{GS} = 4.5V$	2.6A

## Description

This new generation MOSFET is 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.

## Applications

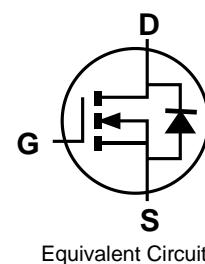
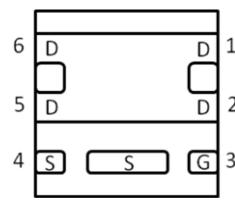
- Power Management Functions
- Battery Operated Systems and Solid-State Relays
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories, Transistors, etc.

## Features and Benefits

- 0.6mm Profile – Ideal for Low Profile Applications
- PCB Footprint of 4mm<sup>2</sup>
- Low On-Resistance
- Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- Halogen and Antimony Free. "Green" Device (Note 3)

## Mechanical Data

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



## Ordering Information (Note 4)

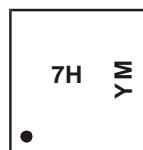
Part Number	Compliance	Case	Quantity per reel
DMN10H170SFDE-7	Standard	U-DFN2020-6	3,000
DMN10H170SFDE-13	Standard	U-DFN2020-6	10,000

Notes:

- No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
- See [http://www.diodes.com/quality/lead\\_free.html](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.
- Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds
- For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

## Marking Information

U-DFN2020-6



7H = Product Type Marking Code  
 YM = Date Code Marking  
 Y = Year (ex: B = 2014)  
 M = Month (ex: 9 = September)

### Date Code Key

Year	2014	2015	2016	2017	2018	2019	2020	2020				
Code	B	C	D	E	F	G	H	I				
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 (@ $T_A = +25^\circ\text{C}$  unless otherwise specified.)

Characteristic			Symbol	Value	Units
Drain-Source Voltage			$V_{DSS}$	100	V
Gate-Source Voltage			$V_{GSS}$	$\pm 20$	V
Continuous Drain Current (Note 6) $V_{GS} = 10\text{V}$	Steady State	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	2.9 2.3	A
	$t < 10\text{s}$	$T_A = +25^\circ\text{C}$ $T_A = +70^\circ\text{C}$	$I_D$	3.4 2.7	A
Pulsed Drain Current (10 $\mu\text{s}$ pulse, duty cycle = 1%)			$I_{DM}$	10	A
Maximum Body Diode Continuous Current			$I_S$	2.5	A
Avalanche Current (Note 7)			$I_{AS}$	4.7	A
Avalanche Energy (Note 7)			$E_{AS}$	16	$\text{mJ}$

 Thermal Characteristics (@ $T_A = +25^\circ\text{C}$  unless otherwise specified.)

Characteristic	Symbol	Value	Units
Total Power Dissipation (Note 5)	$P_D$	0.66	W
		0.42	
Thermal Resistance, Junction to Ambient (Note 5)	$R_{\theta JA}$	189	$^\circ\text{C/W}$
		132	
Total Power Dissipation (Note 6)	$P_D$	2.03	W
		1.31	
Thermal Resistance, Junction to Ambient (Note 6)	$R_{\theta JA}$	61	$^\circ\text{C/W}$
		43	
Thermal Resistance, Junction to Case (Note 6)	$R_{\theta JC}$	9.3	
Operating and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

 Electrical Characteristics (@ $T_A = +25^\circ\text{C}$  unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
<b>OFF CHARACTERISTICS (Note 8)</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	100	-	-	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
Zero Gate Voltage Drain Current $T_J = +25^\circ\text{C}$	$I_{DS}$	-	-	1	$\mu\text{A}$	$V_{DS} = 100\text{V}, V_{GS} = 0\text{V}$
Gate-Source Leakage	$I_{GSS}$	-	-	$\pm 100$	$\text{nA}$	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$
<b>ON CHARACTERISTICS (Note 8)</b>						
Gate Threshold Voltage	$V_{GS(\text{th})}$	1.0	2.0	3.0	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
Static Drain-Source On-Resistance	$R_{DS(\text{ON})}$	-	116	160	$\text{m}\Omega$	$V_{GS} = 10\text{V}, I_D = 5.0\text{A}$
			126	200		$V_{GS} = 4.5\text{V}, I_D = 5.0\text{A}$
Diode Forward Voltage	$V_{SD}$	-	0.9	1.0	V	$V_{GS} = 0\text{V}, I_S = 10\text{A}$
<b>DYNAMIC CHARACTERISTICS (Note 9)</b>						
Input Capacitance	$C_{iss}$	-	1167	-	$\text{pF}$	$V_{DS} = 25\text{V}, V_{GS} = 0\text{V}, f = 1.0\text{MHz}$
Output Capacitance	$C_{oss}$	-	36	-	$\text{pF}$	
Reverse Transfer Capacitance	$C_{rss}$	-	25	-	$\text{pF}$	
Gate Resistance	$R_g$	-	1.3	-	$\Omega$	$V_{DS} = 0\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$
Total Gate Charge ( $V_{GS} = 4.5\text{V}$ )	$Q_g$	-	4.9	-	$\text{nC}$	$V_{DS} = 80\text{V}, I_D = 12.8\text{A}$
Total Gate Charge ( $V_{GS} = 10\text{V}$ )	$Q_g$	-	9.7	-	$\text{nC}$	
Gate-Source Charge	$Q_{gs}$	-	2.0	-	$\text{nC}$	
Gate-Drain Charge	$Q_{gd}$	-	2.0	-	$\text{nC}$	
Turn-On Delay Time	$t_{D(\text{on})}$	-	10.5	-	$\text{ns}$	
Turn-On Rise Time	$t_r$	-	11.1	-	$\text{ns}$	$V_{DS} = 50\text{V}, I_D = 12.8\text{A}$ $V_{GS} = 10\text{V}, R_G = 25\Omega$
Turn-Off Delay Time	$t_{D(\text{off})}$	-	42.6	-	$\text{ns}$	
Turn-Off Fall Time	$t_f$	-	12.8	-	$\text{ns}$	
Reverse Recovery Time	$T_{rr}$	-	30.3	-	$\text{ns}$	$I_F = 12.8\text{A}, \text{di}/\text{dt} = 100\text{A}/\mu\text{s}$
Reverse Recovery Charge	$Q_{rr}$	-	35.2	-	$\text{nC}$	

Notes: 5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.

6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

7. UIS in production with  $L = 1.43\text{mH}, T_J = +25^\circ\text{C}$ .

8. Short duration pulse test used to minimize self-heating effect.

9. Guaranteed by design. Not subject to product testing.

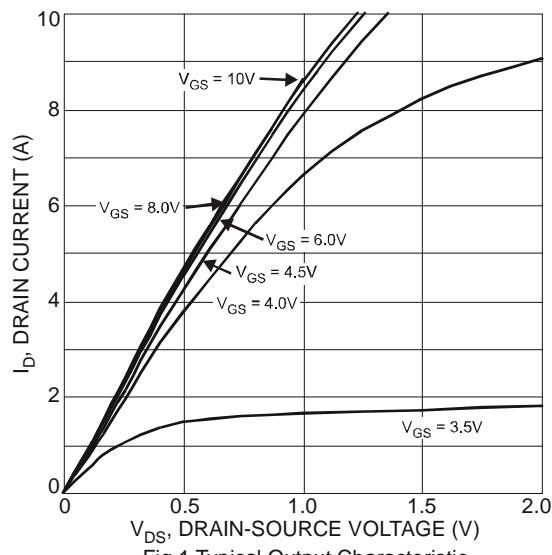


Fig. 1 Typical Output Characteristic

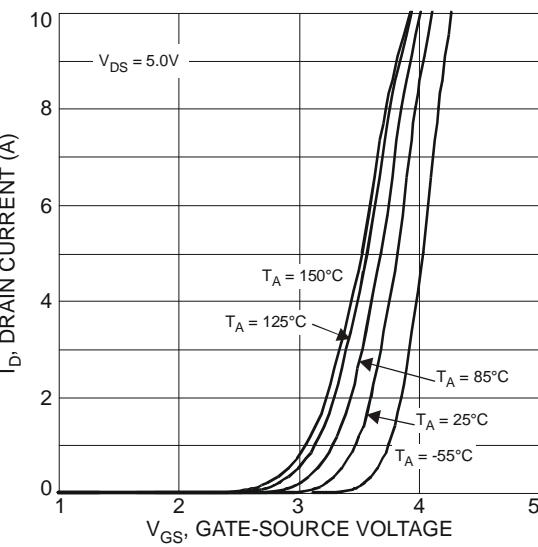


Fig. 2 Typical Transfer Characteristics

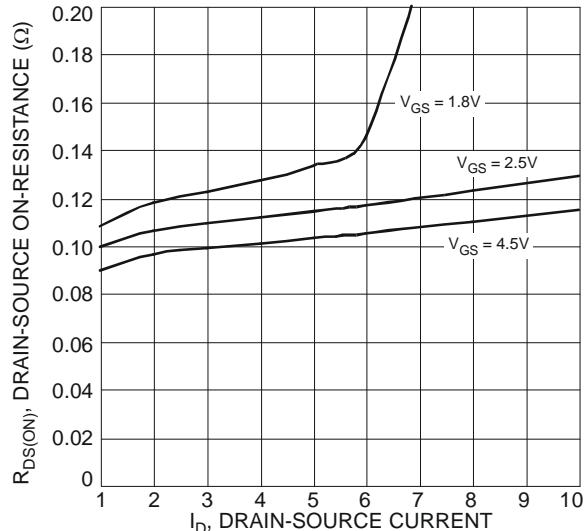


Fig. 3 Typical On-Resistance vs.  
Drain Current and Gate Voltage

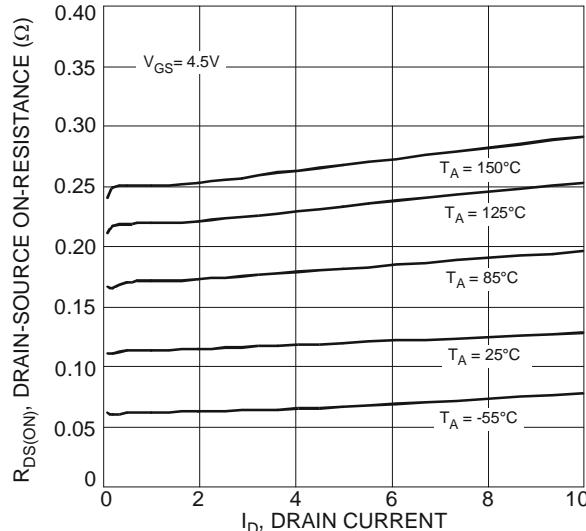


Fig. 4 Typical On-Resistance vs.  
Drain Current and Temperature

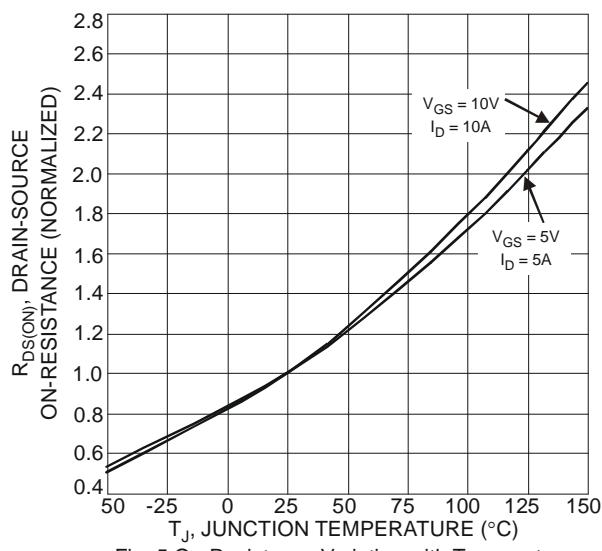


Fig. 5 On-Resistance Variation with Temperature

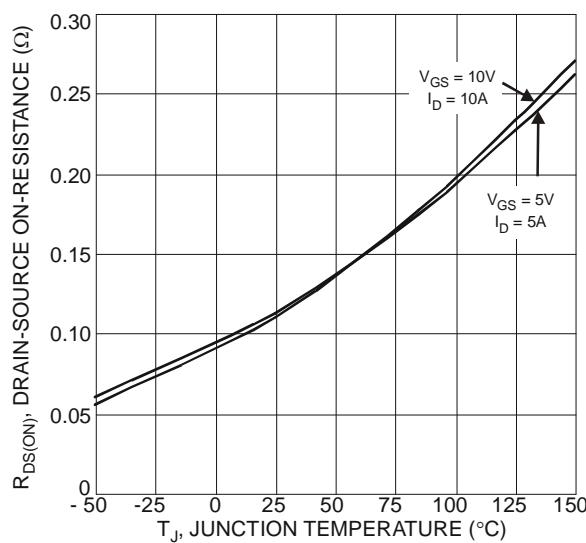


Fig. 6 On-Resistance Variation with Temperature

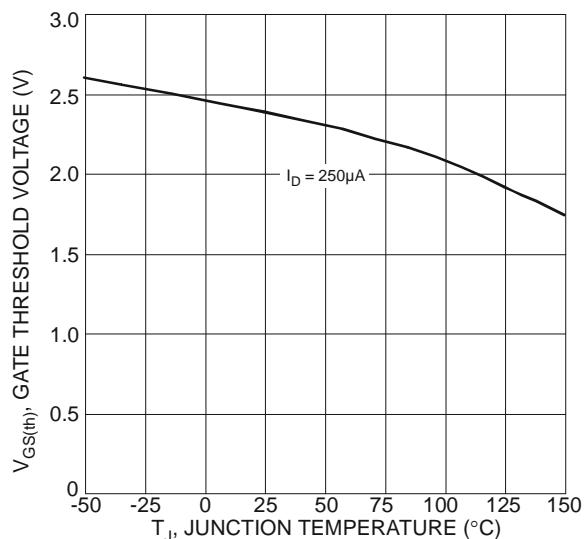


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

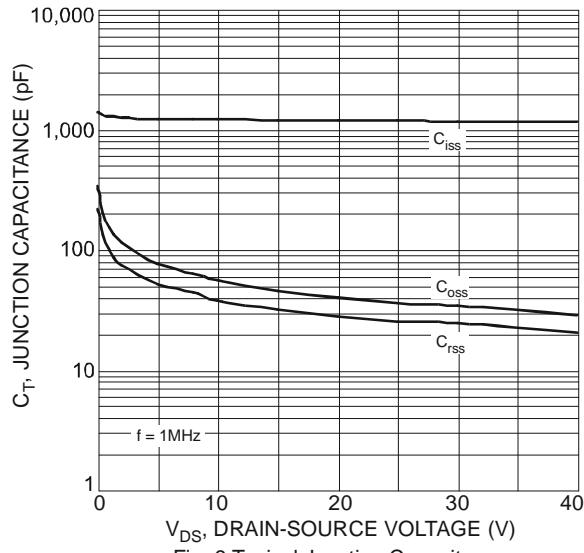


Fig. 9 Typical Junction Capacitance

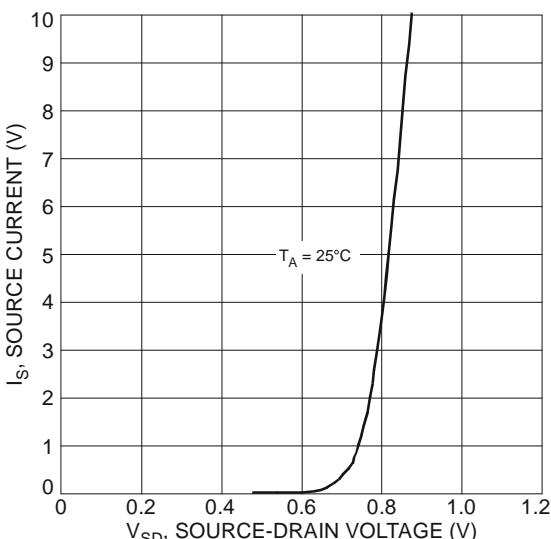


Fig. 8 Diode Forward Voltage vs. Current

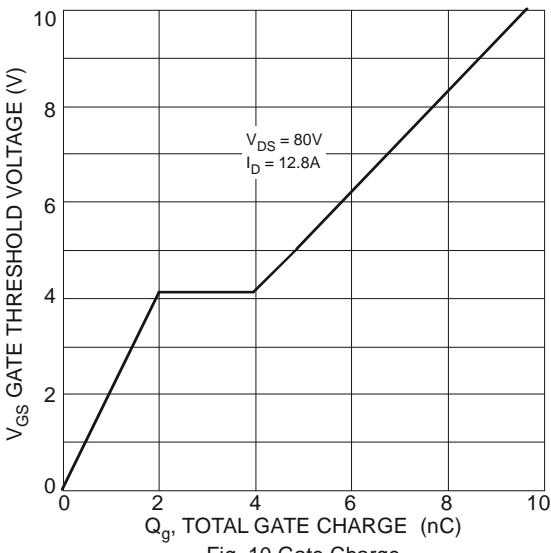


Fig. 10 Gate Charge

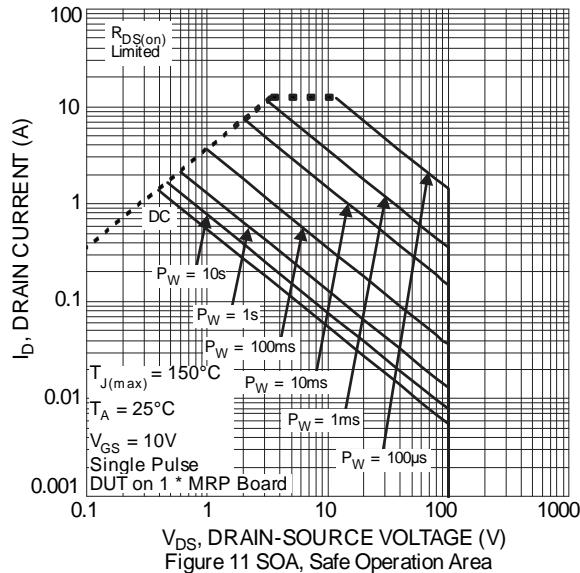
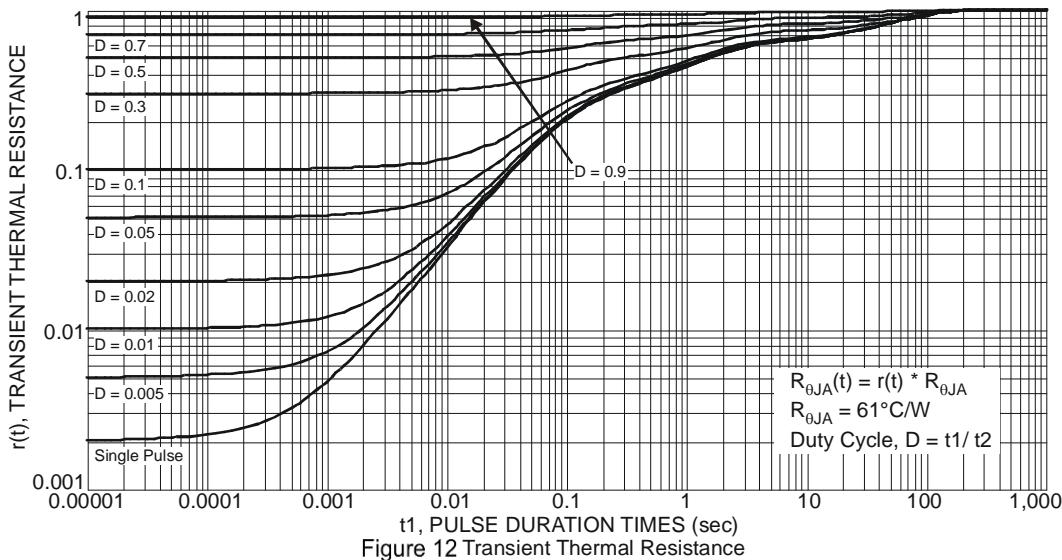
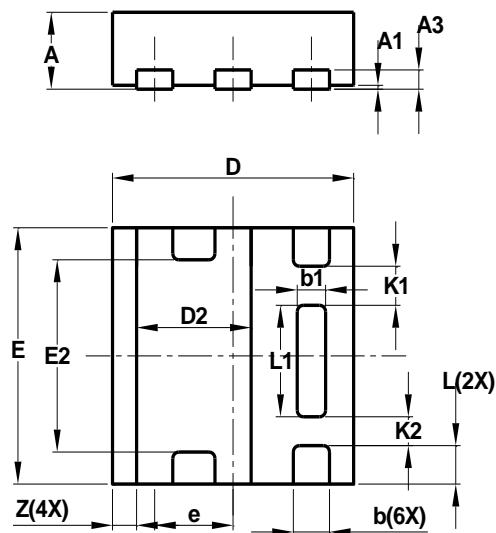


Figure 11 SOA, Safe Operation Area



## Package Outline Dimensions

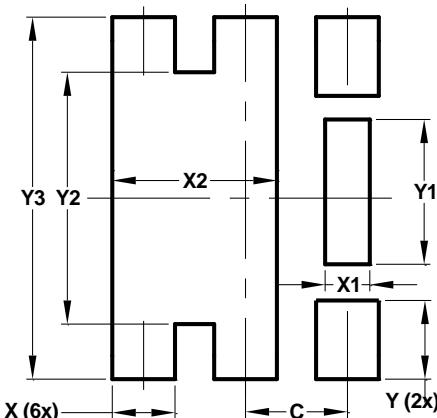
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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

## Suggested Pad Layout

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



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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