

**20V P-CHANNEL ENHANCEMENT MODE MOSFET
POWERDI®**

Product Summary

$V_{(BR)DSS}$	$R_{DS(ON)}$ max	I_D max $T_C = +25^\circ C$
-20V	5.2m Ω @ $V_{GS} = -4.5V$	-40A
	7.5m Ω @ $V_{GS} = -2.5V$	-40A

Description

This 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.

Applications

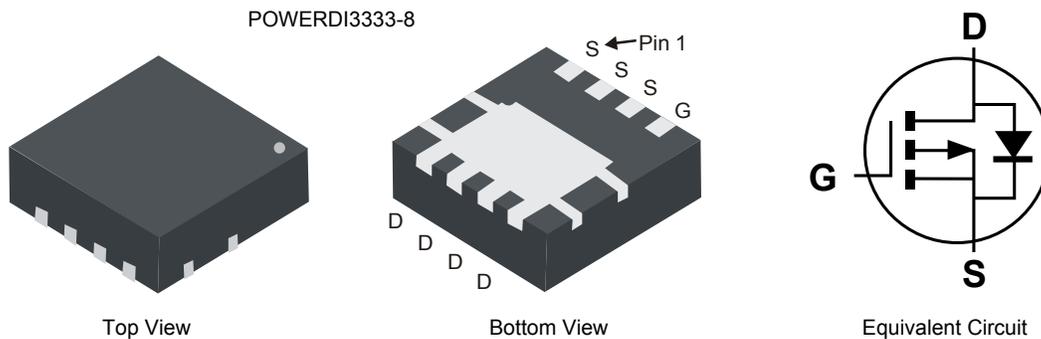
- Load Switch
- Power Management Functions

Features

- Low $R_{DS(ON)}$ – ensures on state losses are minimized
- Small form factor thermally efficient package enables higher density end products
- Occupies just 33% of the board area occupied by SO-8 enabling smaller end product
- **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**

Mechanical Data

- Case: POWERDI3333-8
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminal Connections Indicator: See diagram
- Terminals: Finish — Matte Tin annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.008 grams (approximate)

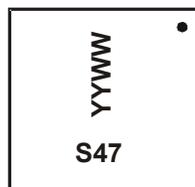


Ordering Information (Note 4)

Part Number	Case	Packaging
DMP2006UFG-7	POWERDI3333-8	2000/Tape & Reel
DMP2006UFG-13	POWERDI3333-8	3000/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



S47 = Product Type Marking Code
YYWW = Date Code Marking
YY = Last digit of year (ex: 13 = 2013)
WW = Week code (01 ~ 53)

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

Characteristic			Symbol	Value	Units
Drain-Source Voltage			V _{DSS}	-20	V
Gate-Source Voltage (Note 5)			V _{GSS}	±10	V
Continuous Drain Current (Note 6) V _{GS} = -4.5V	Steady State	T _A = +25°C	I _D	-17.5	A
		T _A = +70°C		-14.0	
		T _C = +25°C		-40	
Pulsed Drain Current (10µs pulse, duty cycle = 1%)			I _{DM}	-80	A
Maximum Continuous Body Diode Forward Current (Note 6)			I _S	-2.2	A
Avalanche Current (Note 8) L=0.1mH			I _{AS}	-23	A
Avalanche Energy (Note 8) L=0.1mH			E _{AS}	28	mJ

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

Characteristic		Symbol	Value	Units
Total Power Dissipation (Note 6)	T _A = +25°C	P _D	2.3	W
	T _C = +25°C		41	
Thermal Resistance, Junction to Ambient	(Note 6)	R _{θJA}	54	°C/W
	(Note 7)		136	
Thermal Resistance, Junction to Case (Note 6)		R _{θJC}	3.0	
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 9)						
Drain-Source Breakdown Voltage	BV _{DSS}	-20	—	—	V	V _{GS} = 0V, I _D = -250µA
Zero Gate Voltage Drain Current	I _{DSS}	—	—	-1	µA	V _{DS} = -16V, V _{GS} = 0V
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±8V, V _{DS} = 0V
ON CHARACTERISTICS (Note 9)						
Gate Threshold Voltage	V _{GS(th)}	-0.4	—	-1.0	V	V _{DS} = V _{GS} , I _D = -250µA
Static Drain-Source On-Resistance	R _{DS(on)}	—	4.2	5.2	mΩ	V _{GS} = -4.5V, I _D = -15A
		—	5.4	7.5		V _{GS} = -2.5V, I _D = -10A
		—	7	—		V _{GS} = -1.8V, I _D = -1A
Diode Forward Voltage	V _{SD}	—	-0.7	-1.2	V	V _{GS} = 0V, I _S = -10A
DYNAMIC CHARACTERISTICS (Note 10)						
Input Capacitance	C _{ISS}	—	5404	—	pF	V _{DS} = -10V, V _{GS} = 0V f = 1.0MHz
Output Capacitance	C _{OSS}	—	728	—		
Reverse Transfer Capacitance	C _{RSS}	—	612	—		
Gate Resistance	R _G	—	3.8	—	Ω	V _{DS} = 0V, V _{GS} = 0V, f = 1.0MHz
Total Gate Charge (V _{GS} = -4.5V)	Q _g	—	64	—	nC	V _{DD} = -10V, I _D = -20A
Total Gate Charge (V _{GS} = -10V)	Q _g	—	140	—		
Gate-Source Charge	Q _{GS}	—	8.5	—		
Gate-Drain Charge	Q _{gd}	—	17	—		
Turn-On Delay Time	t _{D(on)}	—	9.1	—	ns	V _{GS} = -4.5V, V _{DD} = -10V, R _G = 1Ω, R _G = 1Ω, I _D = -10A
Turn-On Rise Time	t _r	—	19	—		
Turn-Off Delay Time	t _{D(off)}	—	146	—		
Turn-Off Fall Time	t _f	—	104	—		
Reverse Recovery Time (Note 10)	t _{rr}	—	61	—	ns	I _F = -10A, di/dt = 100A/µs
Reverse Recovery Charge (Note 10)	Q _{rr}	—	44	—	nC	I _F = -10A, di/dt = 100A/µs

- Notes:
- AEC-Q101 VGS maximum is ±8V
 - R_{θJA} is determined with the device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate. R_{θJC} is guaranteed by design while R_{θJA} is determined by the user's board design.
 - Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
 - UIS in production with L = 0.1mH, T_J = +25°C
 - Short duration pulse test used to minimize self-heating effect.
 - Guaranteed by design. Not subject to product testing.

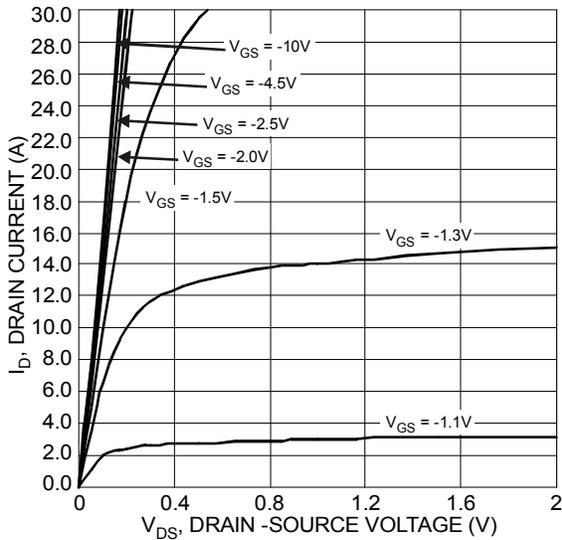


Figure 1 Typical Output Characteristics

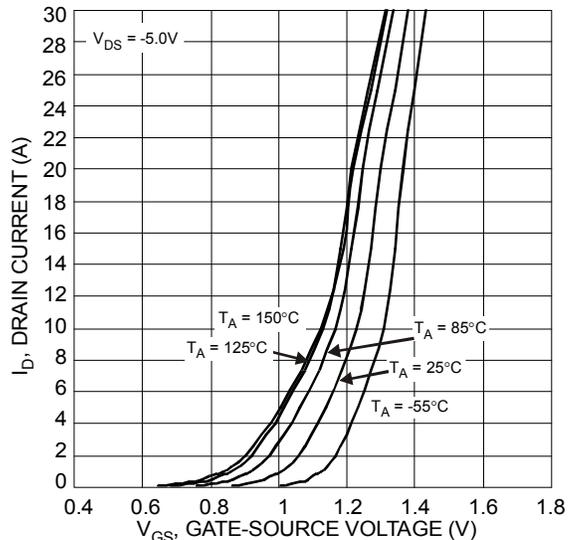


Figure 2 Typical Transfer Characteristics

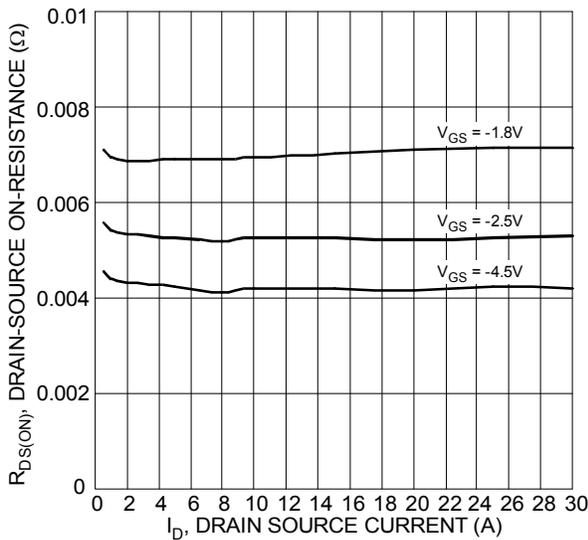


Figure 3 Typical On-Resistance vs. Drain Current and Gate Voltage

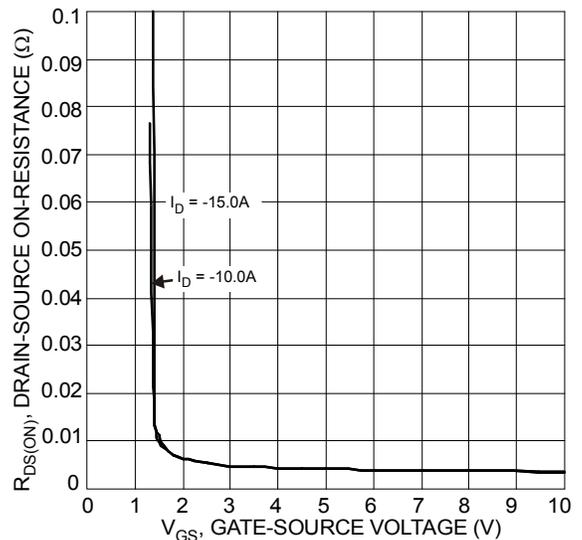


Figure 4 Typical Transfer Characteristics

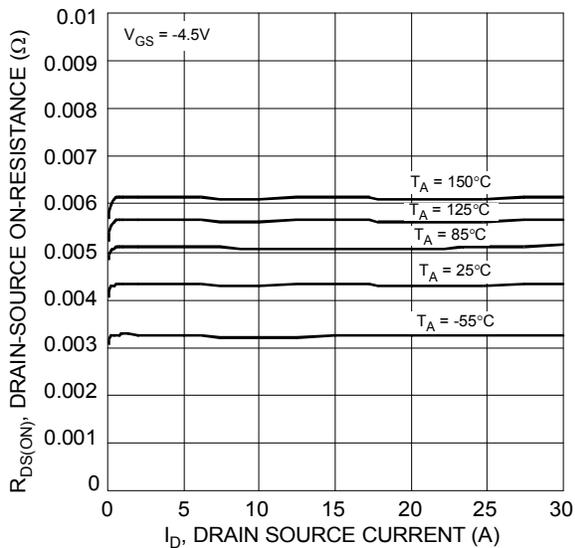


Figure 5 Typical On-Resistance vs. Drain Current and Temperature

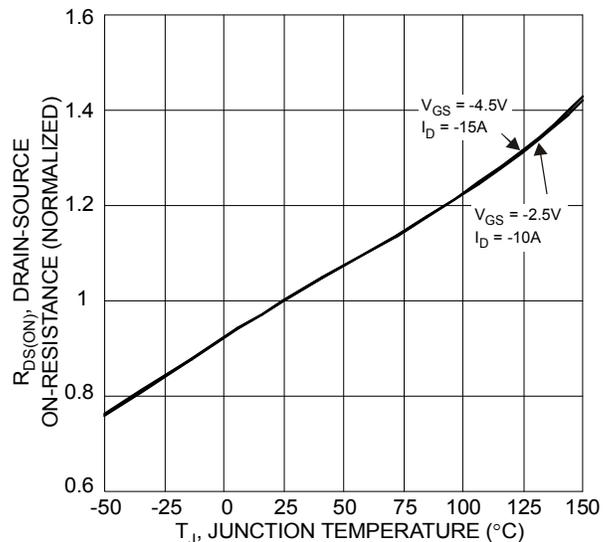


Figure 6 On-Resistance Variation with Temperature

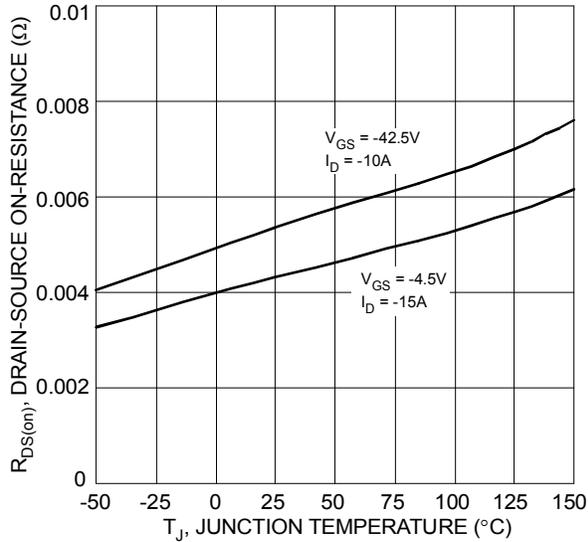


Figure 7 On-Resistance Variation with Temperature

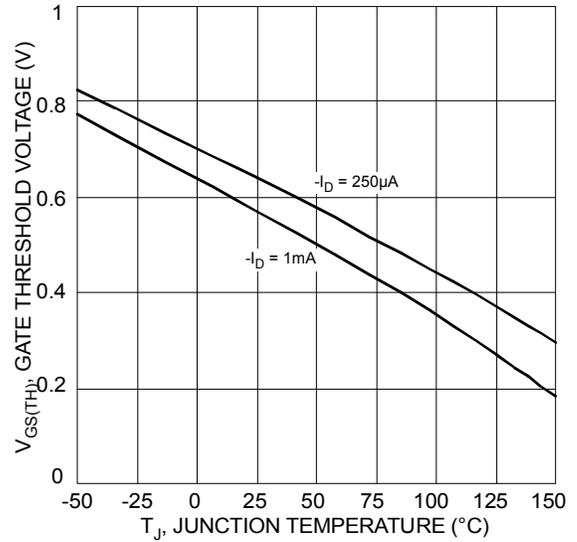


Figure 8 Gate Threshold Variation vs. Ambient Temperature

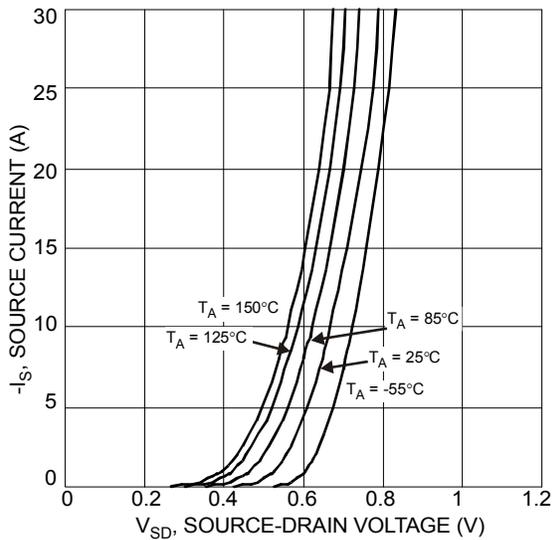


Figure 9 Diode Forward Voltage vs. Current

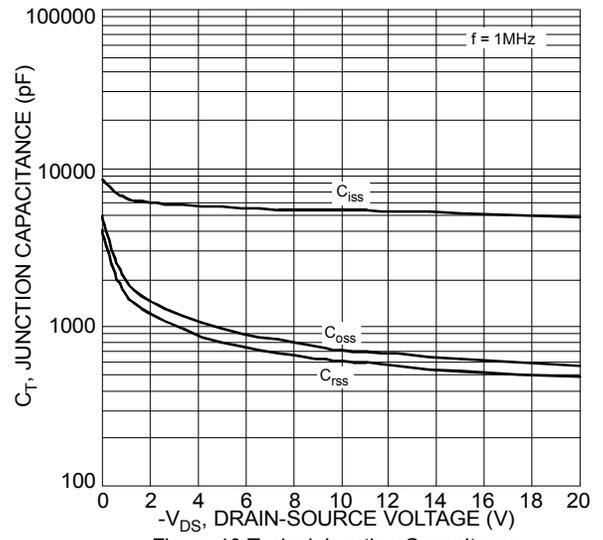


Figure 10 Typical Junction Capacitance

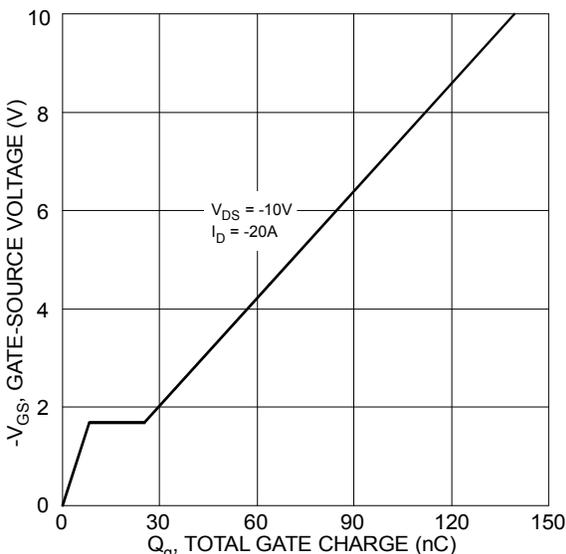


Figure 11 Gate-Charge Characteristics

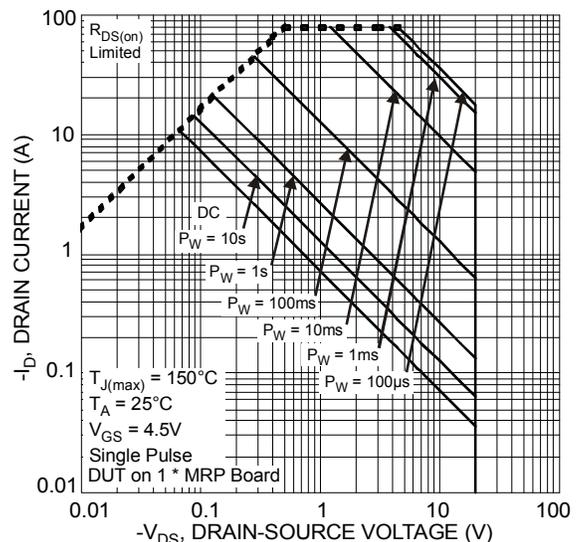
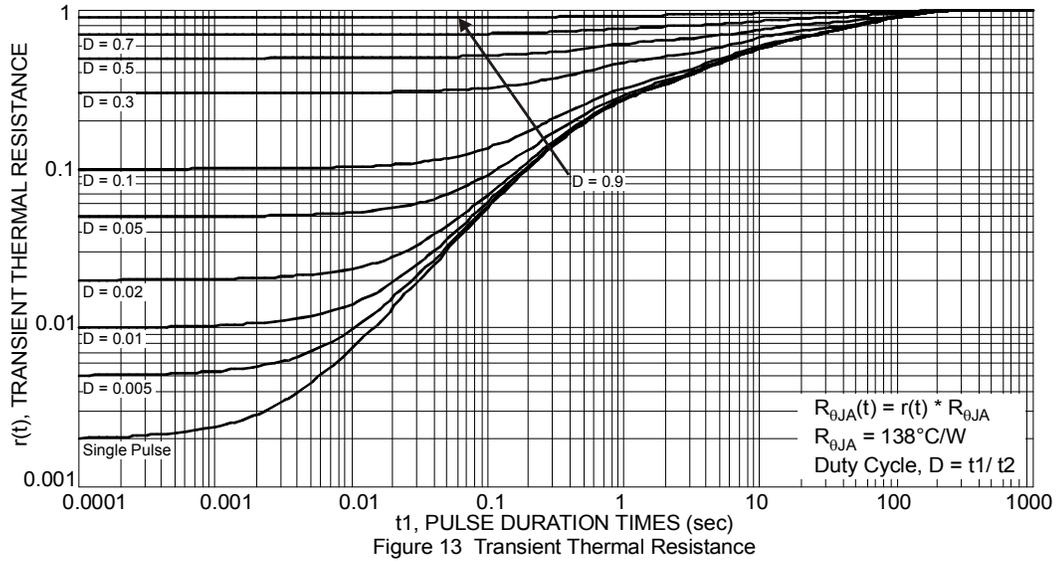
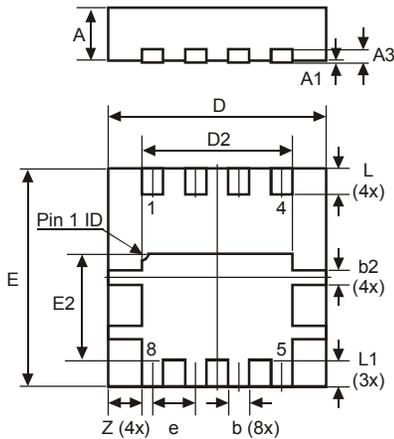


Figure 12 SOA, Safe Operation Area



Package Outline Dimensions

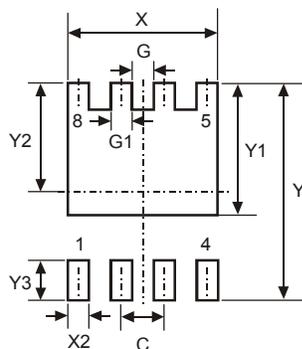
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



POWERDI3333-8			
Dim	Min	Max	Typ
D	3.25	3.35	3.30
E	3.25	3.35	3.30
D2	2.22	2.32	2.27
E2	1.56	1.66	1.61
A	0.75	0.85	0.80
A1	0	0.05	0.02
A3	-	-	0.203
b	0.27	0.37	0.32
b2	-	-	0.20
L	0.35	0.45	0.40
L1	-	-	0.39
e	-	-	0.65
Z	-	-	0.515
All Dimensions in mm			

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
G	0.230
G1	0.420
Y	3.700
Y1	2.250
Y2	1.850
Y3	0.700
X	2.370
X2	0.420

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