



YOUSHANG SEMICONDUCTOR

设计研发新型功率器件

各类小信号开关

中低压及高压大电流等场效应管

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企业微信二维码



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Product Summary

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D $T_A = +25^\circ C$
60V	68m Ω @ $V_{GS} = 10V$	8.5A
	100m Ω @ $V_{GS} = 4.5V$	7.0A

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

- Motor Control
- Transformer Driving Switch
- DC-DC Converters
- Power Management Functions
- Uninterrupted Power Supply

Features and Benefits

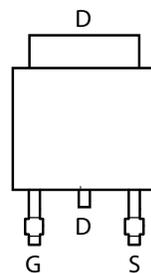
- 100% Unclamped Inductive Switch (UIS) test in production
- Low on-resistance
- Fast switching speed

Mechanical Data

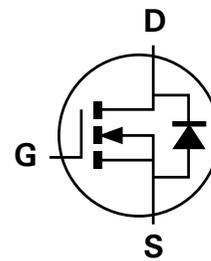
- Case: TO252
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0 (Note 1)
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals Connections: See Diagram
- Terminals: Matte Tin Finish annealed over Copper leadframe. Solderable per MIL-STD-202, Method 208
- Weight: 0.33 grams (approximate)



TOP VIEW



PIN OUT -TOP VIEW



Equivalent Circuit

Maximum Ratings (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

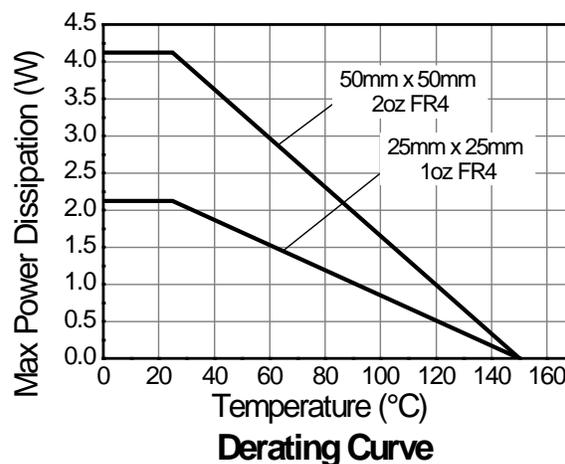
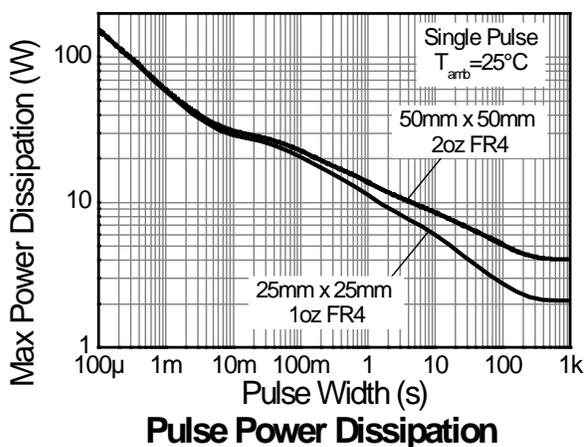
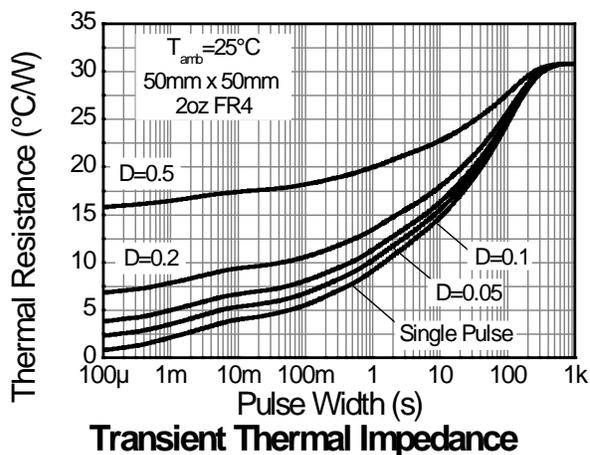
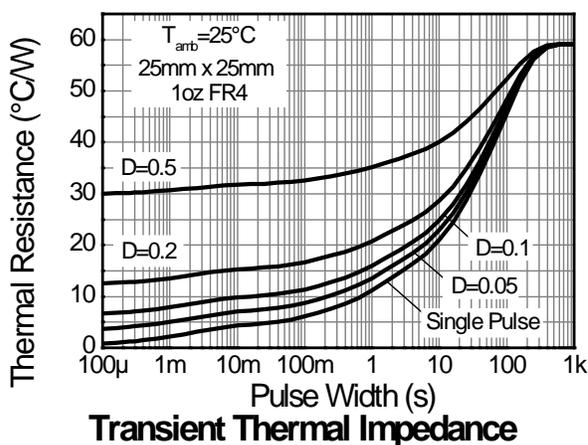
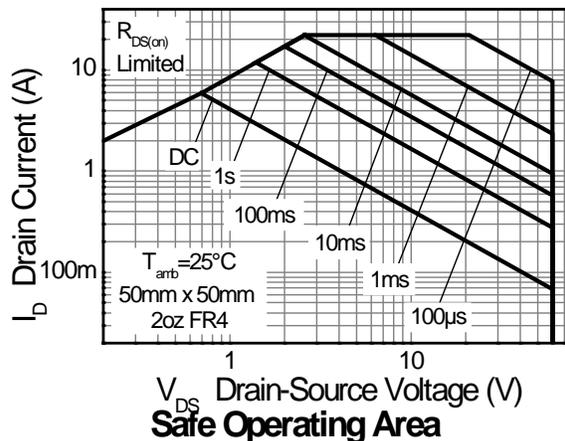
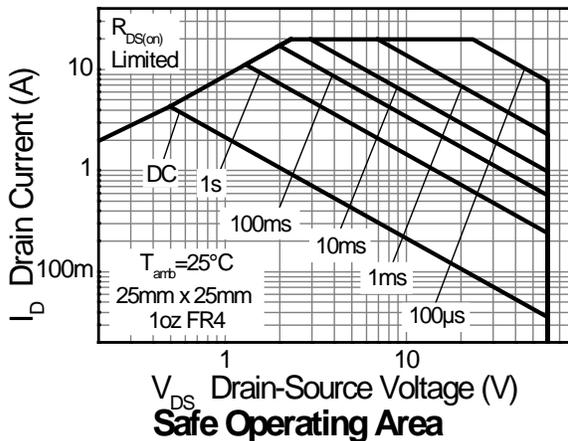
Characteristic		Symbol	Value	Unit	
Drain-Source voltage		V_{DS}	60	V	
Gate-Source voltage	(Note 5)	V_{GS}	± 20	V	
Single Pulsed Avalanche Energy		E_{AS}	37.5	mJ	
Single Pulsed Avalanche Current		I_{AS}	5.0	A	
Continuous Drain current	$V_{GS} = 10V$	(Note 7)	8.5	A	
		$T_A = 70^\circ\text{C}$ (Note 7)	6.8		
		(Note 6)	6.0		
Pulsed Drain current	$V_{GS} = 10V$	(Note 8)	I_{DM}	22.2	A
Continuous Source current (Body diode)		(Note 7)	I_S	10.2	A
Pulsed Source current (Body diode)		(Note 8)	I_{SM}	22.2	A

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

Characteristic		Symbol	Value	Unit
Power dissipation Linear derating factor	(Note 6)	P_D	4.12	W mW/ $^\circ\text{C}$
			33	
	(Note 7)		8.49	
			67.9	
	(Note 9)		2.12	
			16.9	
Thermal Resistance, Junction to Ambient	(Note 6)	$R_{\theta JA}$	30.3	$^\circ\text{C/W}$
	(Note 7)		14.7	
	(Note 9)		59.0	
Thermal Resistance, Junction to Lead	(Note 10)	$R_{\theta JL}$	3.09	
Operating and storage temperature range		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

- Notes:
- AEC-Q101 V_{GS} maximum is $\pm 16V$.
 - For a device surface mounted on 50mm x 50mm x 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.
 - Same as note 2, except the device is measured at $t \leq 10$ sec.
 - Same as note 2, except the device is pulsed with $D = 0.02$ and pulse width 300 μs . The pulse current is limited by the maximum junction temperature.
 - For a device surface mounted on 25mm x 25mm x 1.6mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
 - Thermal resistance from junction to solder-point (at the end of the drain lead).
 - UIS in production with $L = 3.0\text{mH}$, $I_{AS} = 5.0\text{A}$, $R_G = 25^\bullet$, $V_{DD} = 50V$, starting $T_J = 25^\circ\text{C}$

Thermal Characteristics

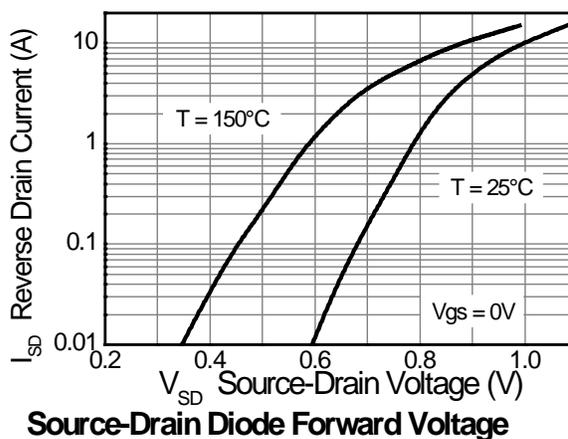
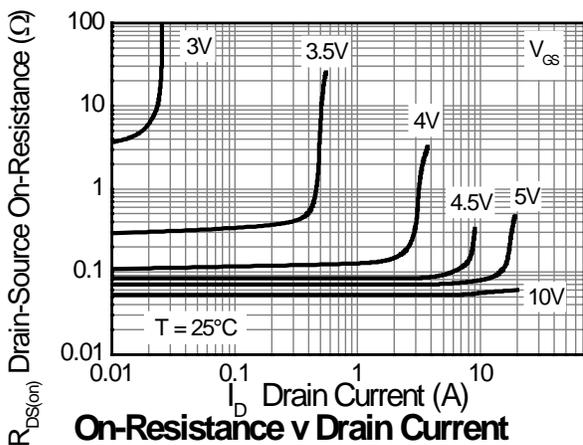
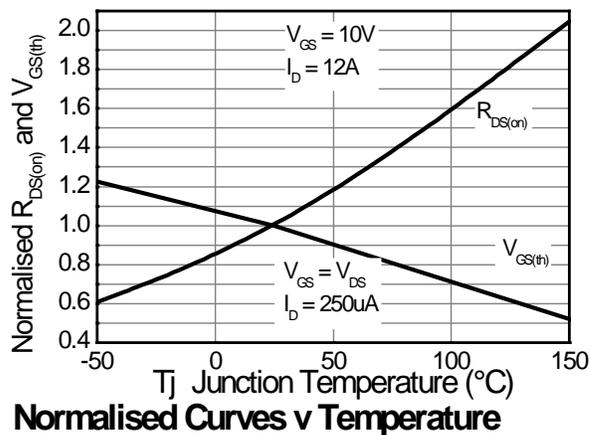
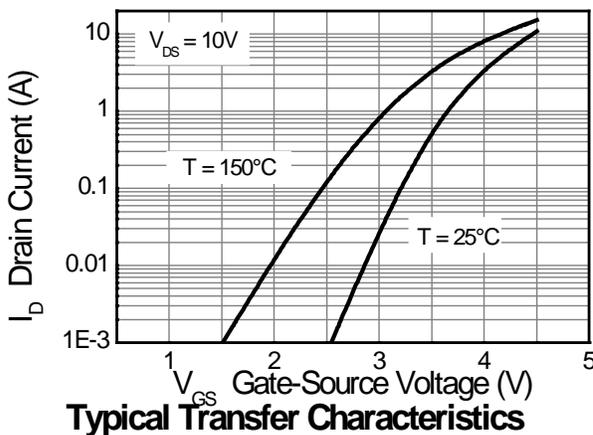
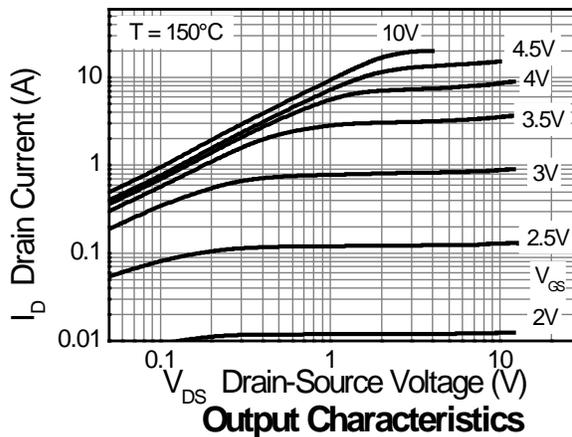
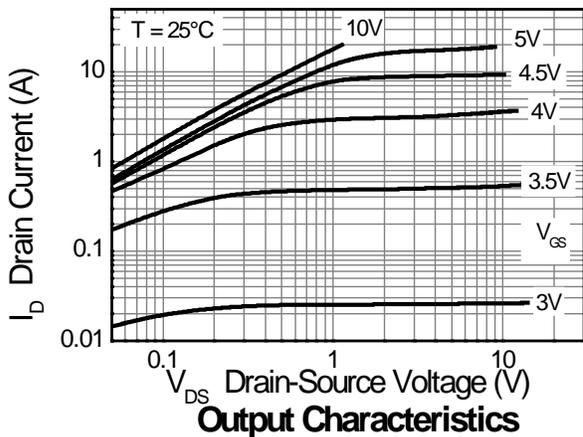


Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

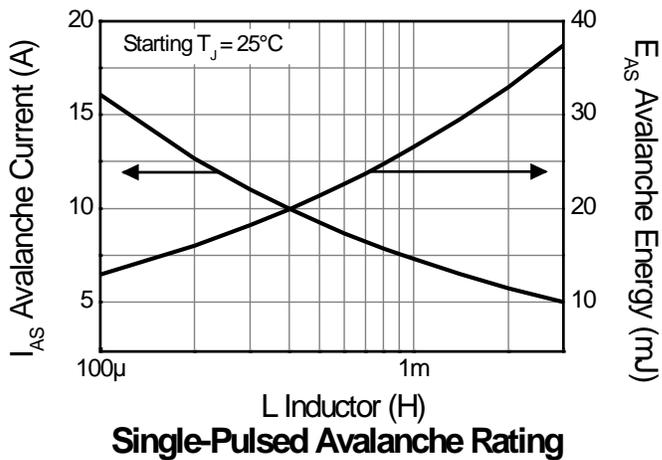
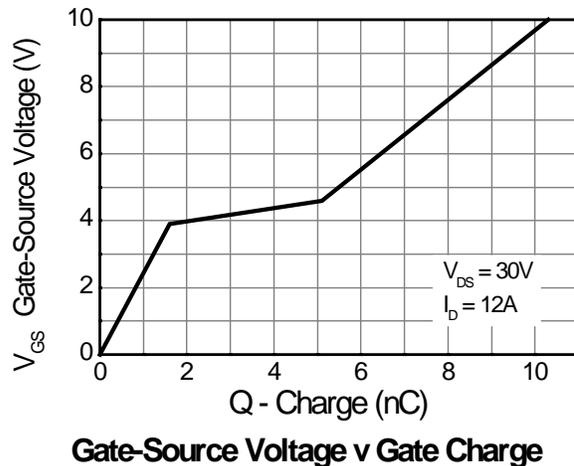
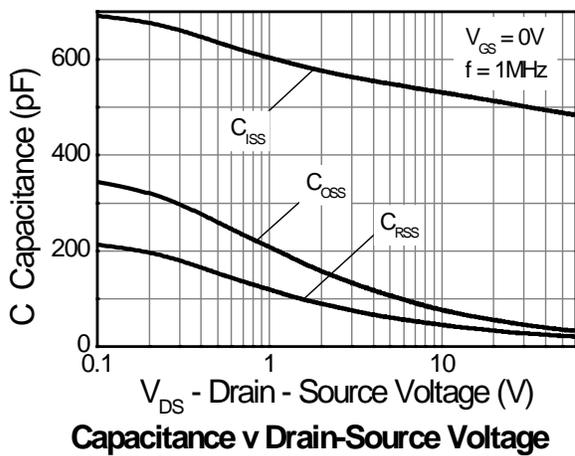
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition	
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	BV _{DSS}	60	—	—	V	I _D = 250μA, V _{GS} = 0V	
Zero Gate Voltage Drain Current	I _{DSS}	—	—	0.5	μA	V _{DS} = 60V, V _{GS} = 0V	
Gate-Source Leakage	I _{GSS}	—	—	±100	nA	V _{GS} = ±20V, V _{DS} = 0V	
ON CHARACTERISTICS							
Gate Threshold Voltage	V _{GS(th)}	1.0	—	3.0	V	I _D = 250μA, V _{DS} = V _{GS}	
Static Drain-Source On-Resistance (Note 12)	R _{DS(on)}	—	—	0.068	Ω	V _{GS} = 10V, I _D = 12A	
				0.100		V _{GS} = 4.5V, I _D = 6A	
Forward Transconductance (Notes 12 & 13)	g _{fs}	—	19.7	—	S	V _{DS} = 15V, I _D = 12A	
Diode Forward Voltage (Note 12)	V _{SD}	—	0.98	1.15	V	I _S = 12A, V _{GS} = 0V	
Reverse recovery time (Note 13)	t _{rr}	—	145	—	ns	I _S = 12A, di/dt = 100A/μs	
Reverse recovery charge (Note 13)	Q _{rr}	—	929	—	nC		
DYNAMIC CHARACTERISTICS (Note 13)							
Input Capacitance	C _{iss}	—	502	—	pF	V _{DS} = 30V, V _{GS} = 0V f = 1MHz	
Output Capacitance	C _{oss}	—	45.7	—	pF		
Reverse Transfer Capacitance	C _{rss}	—	27.1	—	pF		
Total Gate Charge	Q _g	—	5.55	—	nC	V _{GS} = 4.5V	V _{DS} = 30V I _D = 12A
Total Gate Charge	Q _g	—	10.3	—	nC	V _{GS} = 10V	
Gate-Source Charge	Q _{gs}	—	1.6	—	nC		
Gate-Drain Charge	Q _{gd}	—	3.5	—	nC		
Turn-On Delay Time (Note 14)	t _{D(on)}	—	3.6	—	ns	V _{DD} = 30V, V _{GS} = 10V I _D = 12A, R _G ≅ 6.0Ω	
Turn-On Rise Time (Note 14)	t _r	—	10.8	—	ns		
Turn-Off Delay Time (Note 14)	t _{D(off)}	—	11.9	—	ns		
Turn-Off Fall Time (Note 14)	t _f	—	8.7	—	ns		

- Notes:
12. Measured under pulsed conditions. Pulse width ≤ 300μs; duty cycle ≤ 2%
 13. For design aid only, not subject to production testing.
 14. Switching characteristics are independent of operating junction temperatures.

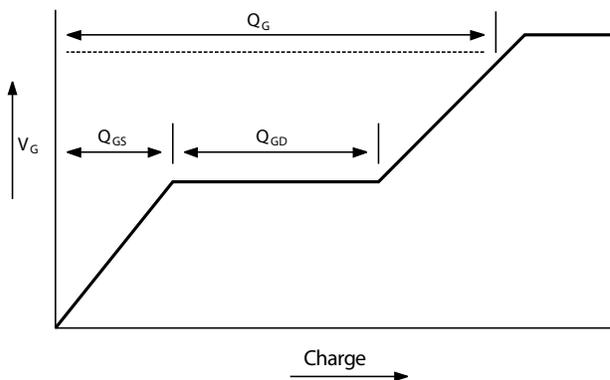
Typical Characteristics



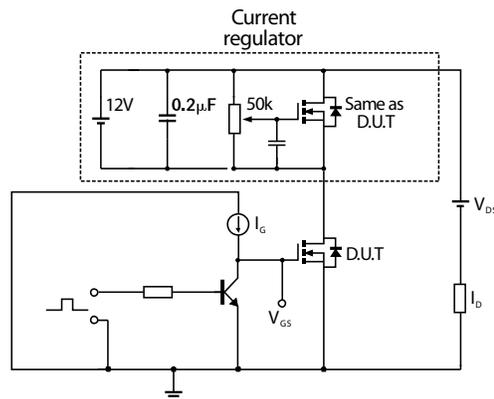
Typical Characteristics - continued



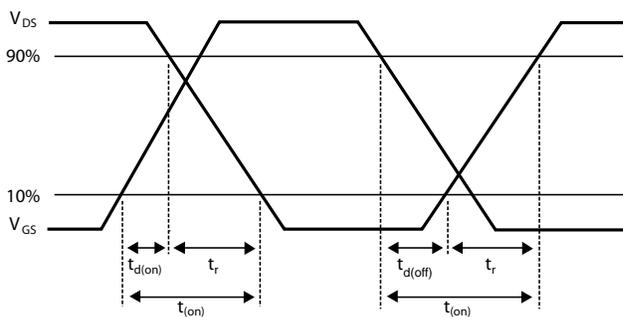
Test Circuits



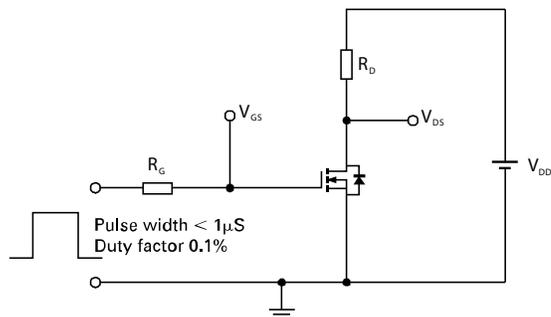
Basic gate charge waveform



Gate charge test circuit

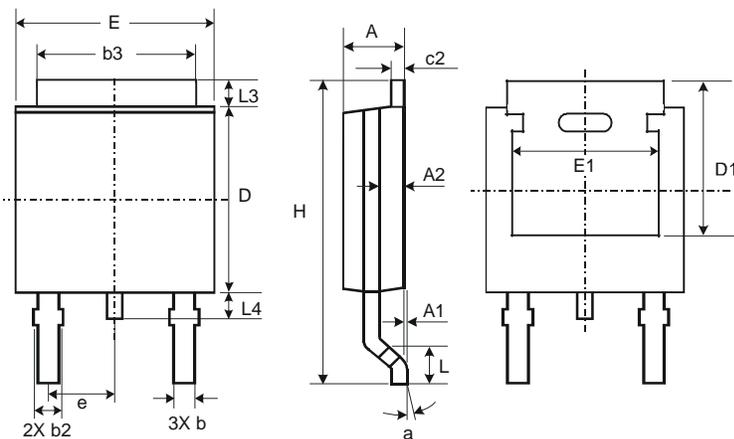


Switching time waveforms



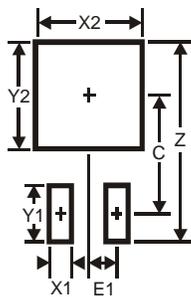
Switching time test circuit

Package Outline Dimensions



TO252			
Dim	Min	Max	Typ
A	2.19	2.39	2.29
A1	0.00	0.13	0.08
A2	0.97	1.17	1.07
b	0.64	0.88	0.783
b2	0.76	1.14	0.95
b3	5.21	5.46	5.33
c2	0.45	0.58	0.531
D	6.00	6.20	6.10
D1	5.21	-	-
e	-	-	2.286
E	6.45	6.70	6.58
E1	4.32	-	-
H	9.40	10.41	9.91
L	1.40	1.78	1.59
L3	0.88	1.27	1.08
L4	0.64	1.02	0.83
a	0°	10°	-
All Dimensions in mm			

Suggested Pad Layout



Dimensions	Value (in mm)
Z	11.6
X1	1.5
X2	7.0
Y1	2.5
Y2	7.0
C	6.9
E1	2.3