优尚

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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Product Summary

BV_{DSS}	**$R_{DS(ON)}$ max**	**I_D max T_A = +25°C**
-30V	50mΩ @ V_{GS} = -10V	-4.0A
	72mΩ @ V_{GS} = -4.5V	-3.3A

Description and Applications

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.

- Load Switch
- DC-DC Converters
- Power Management Functions

Features and Benefits

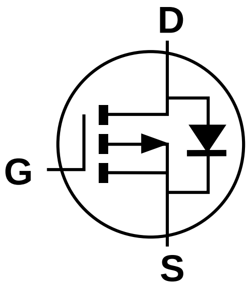
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Low Input/Output Leakage

Mechanical Data

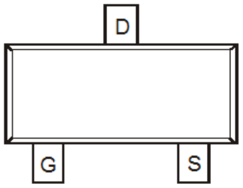
- Case: SC59
- Case Material: Molded Plastic, “Green” Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish —Matte Tin Annealed over Copper Leadframe. Solderable per MIL-STD-202, Method 208 e3
- Terminal Connections: See Diagram
- Weight: 0.014 grams (Approximate)

SC59

Top View



Internal Schematic



Pin Configuration

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

Characteristic			Symbol	Value	Unit
Drain-Source Voltage			V_{DSS}	-30	V
Gate-Source Voltage			V_{GSS}	±20	V
Continuous Drain Current (Note 6) V_{GS} = -10V	Steady State	T_A = +25°C	I_D	-4.0	A
		T_A = +70°C		-3.2	
	t<10s	T_A = +25°C	I_D	-4.6	A
		T_A = +70°C		-3.6	
Continuous Drain Current (Note 6) V_{GS} = -4.5V	Steady State	T_A = +25°C	I_D	-3.3	A
		T_A = +70°C		-2.6	
	t<10s	T_A = +25°C	I_D	-3.9	A
		T_A = +70°C		-3.1	
Pulsed Drain Current (10µs Pulse, Duty Cycle = 1%)			I_{DM}	-30	A
Maximum Body Diode Forward Current (Note 6)			I_S	-2.0	A

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

Characteristic		Symbol	Value	Unit
Total Power Dissipation (Note 5)	T_A = +25°C	P_D	1.1	W
	T_A = +70°C		0.7	
Thermal Resistance, Junction to Ambient (Note 5)	Steady state	$R_{\theta JA}$	166	°C/W
	t<10s		118	
Total Power Dissipation (Note 6)	T_A = +25°C	P_D	1.8	W
	T_A = +70°C		1.1	
Thermal Resistance, Junction to Ambient (Note 6)	Steady state	$R_{\theta JA}$	98	°C/W
	t<10s		71	
Thermal Resistance, Junction to Case (Note 6)		$R_{\theta JC}$	18	
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 7)						
Drain-Source Breakdown Voltage	BV_{DSS}	-30	-	-	V	V_{GS} = 0V, I_D = -250μA
Zero Gate Voltage Drain Current, T_J = +25°C	I_{DSS}	-	-	-1	µA	V_{DS} = -30V, V_{GS} = 0V
Gate-Source Leakage	I_{GSS}	-	-	±100	nA	V_{GS} = ±20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 7)						
Gate Threshold Voltage	$V_{GS(TH)}$	-1.0	-1.5	-2.1	V	V_{DS} = V_{GS}, I_D = -250μA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	-	39	50	mΩ	V_{GS} = -10V, I_D = -4.1A
		-	56	72		V_{GS} = -4.5V, I_D = -3.0A
Forward Transfer Admittance	$\|Y_{fs}\|$	-	8.2	-	S	V_{DS} = -5V, I_D = -4A
Diode Forward Voltage	V_{SD}	-	-0.75	-1.1	V	V_{GS} = 0V, I_S = -1A
DYNAMIC CHARACTERISTICS (Note 8)						
Input Capacitance	C_{iss}	466	582	700	pF	V_{DS} = -15V, V_{GS} = 0V, f = 1.0MHz
Output Capacitance	C_{oss}	80	114	148		
Reverse Transfer Capacitance	C_{rss}	47	76	105		
Gate Resistance	R_g	2	5	8	Ω	V_{DS} = 0V, V_{GS} = 0V, f = 1MHz
Total Gate Charge	Q_g	10.6	13.3	16	nC	V_{GS} = -10V, V_{DS} = -15V, I_D = -4A
Total Gate Charge	Q_g	5.2	6.5	8.5		V_{GS} = -4.5V, V_{DS} = -15V,I_D = -4A
Gate-Source Charge	Q_{gs}	1.3	1.7	2		
Gate-Drain Charge	Q_{gd}	1.1	1.9	2.7		
Turn-On Delay Time	$t_{D(ON)}$	-	6.0	-	ns	V_{GS} = -10V, V_{DS} = -15V, R_L = 3.6Ω, R_G = 3Ω
Turn-On Rise Time	t_R	-	12.9	-		
Turn-Off Delay Time	$t_{D(OFF)}$	-	35.4	-		
Turn-Off Fall Time	t_F	-	30.7	-		
Reverse Recovery Time	t_{RR}	6.8	8.5	10.2	ns	I_F = 4A, di/dt = 100A/μs
Reverse Recovery Charge	Q_{RR}	5.5	7.0	8.5	nC	

Notes:
5. Device mounted on FR-4 PCB with minimum recommended pad layout, single sided. The power dissipation P_D is based on t<10s $R_{\theta JA}$.
6. Device mounted on 1" x 1" FR-4 PCB with high coverage 2 oz. copper, single sided. The power dissipation P_D is based on t<10s $R_{\theta JA}$.
7. Short duration pulse test used to minimize self-heating effect.
8. Guaranteed by design. Not subject to production testing.

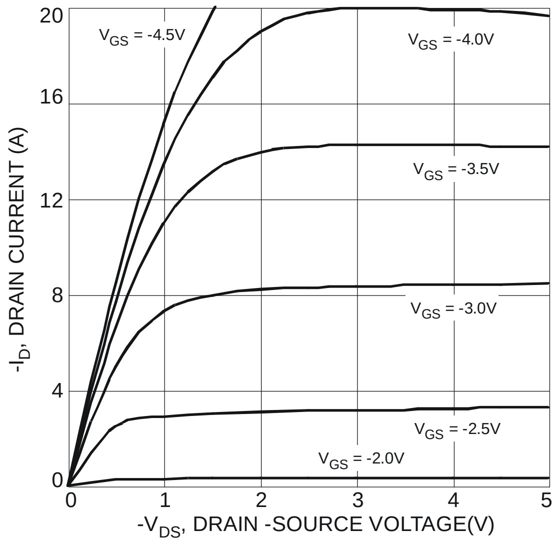


Fig. 1 Typical Output Characteristics

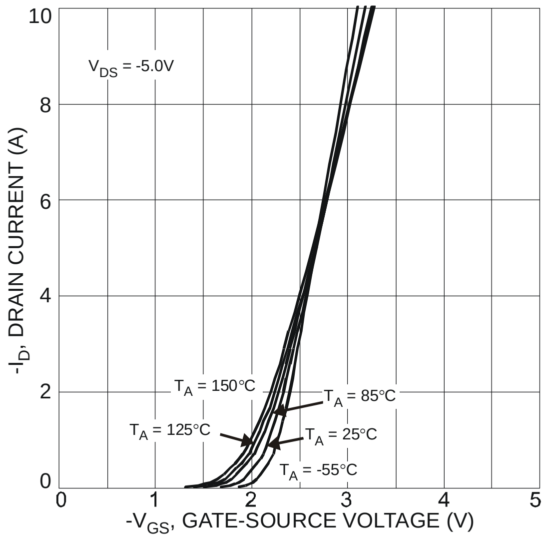


Fig. 2 Typical Transfer Characteristics

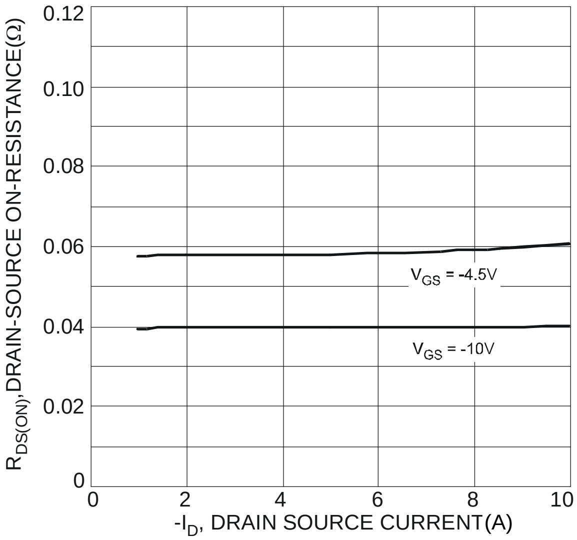


Fig. 3 Typical On-Resistance vs.
Drain Current and Gate Voltage

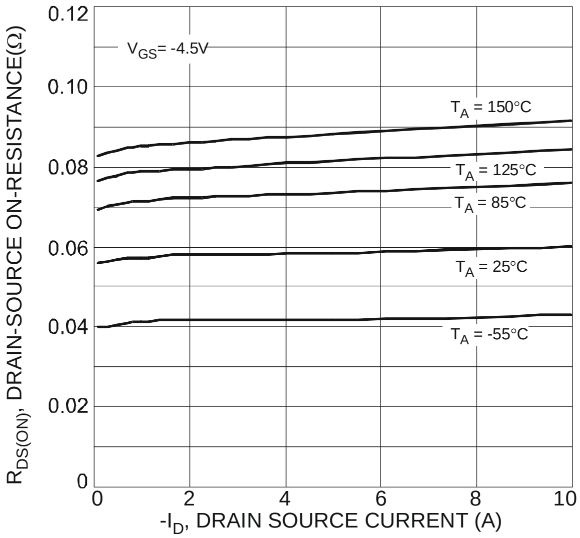


Fig. 4 Typical On-Resistance vs.
Drain Current and Temperature

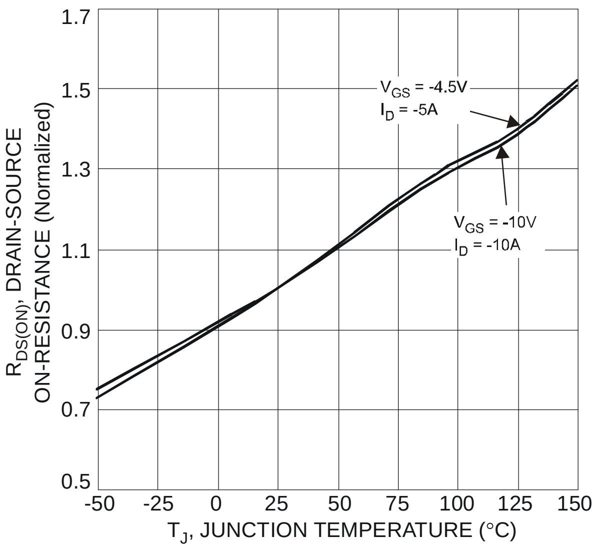


Fig. 5 On-Resistance Variation with Temperature

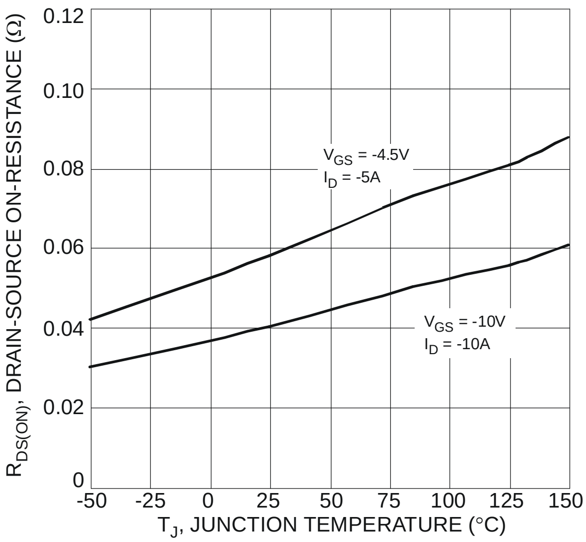


Fig. 6 On-Resistance Variation with Temperature

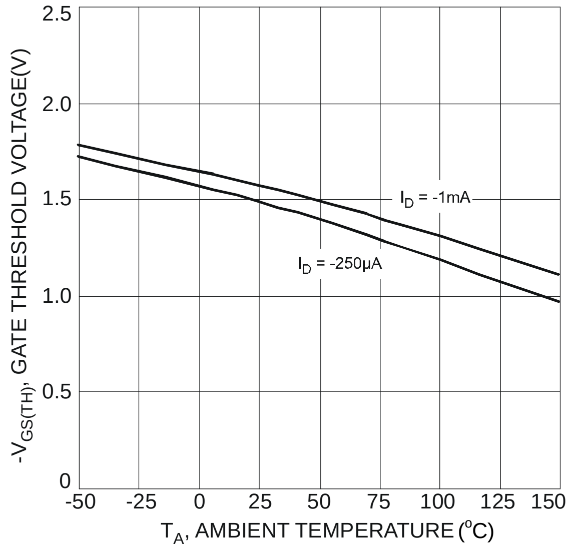


Fig. 7 Gate Threshold Variation vs. Ambient Temperature

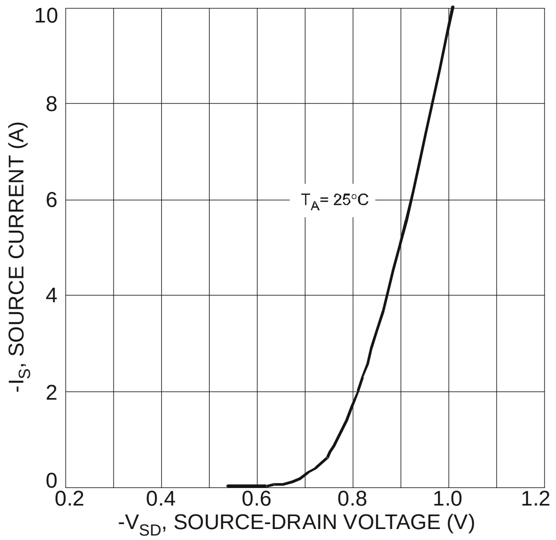


Fig. 8 Diode Forward Voltage vs. Current

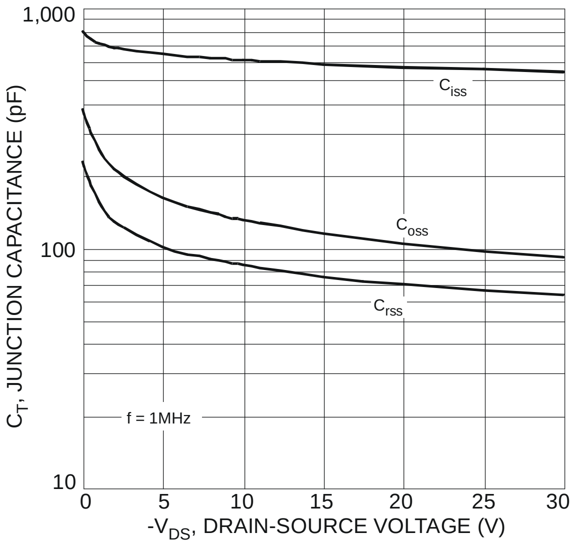


Fig. 9 Typical Junction Capacitance

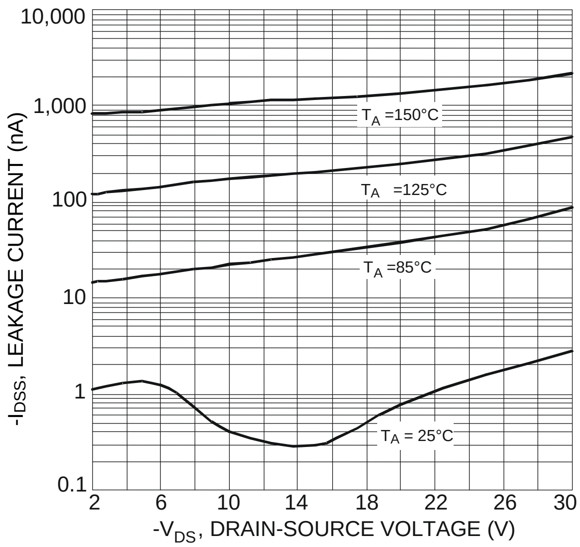


Fig. 10 Typical Drain-Source Leakage Current vs. Voltage

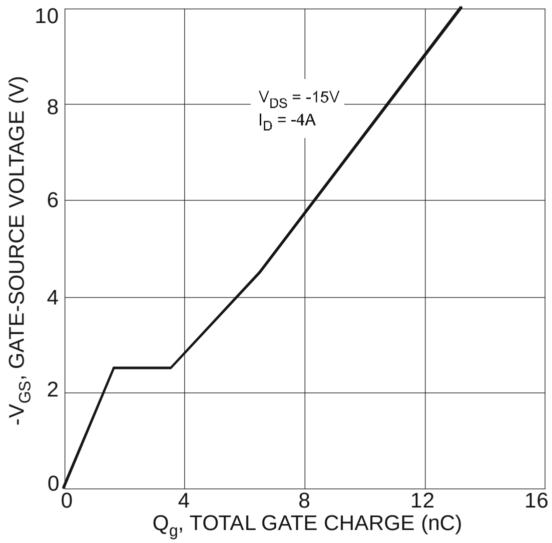


Fig. 11 Gate-Charge Characteristics

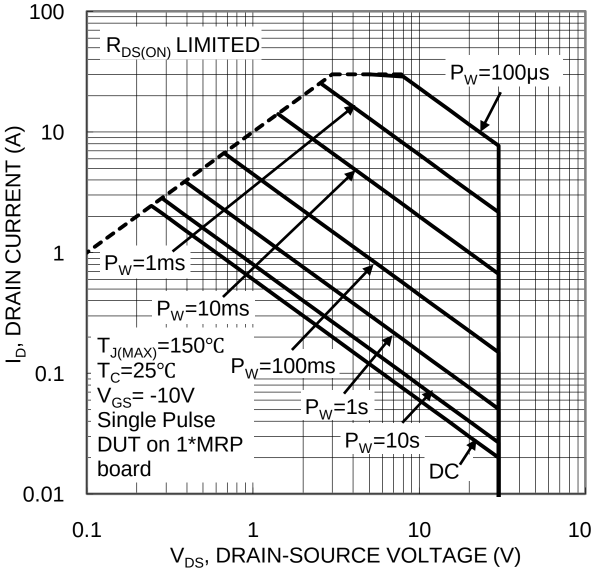


Fig.12 SOA, Safe Operation Area

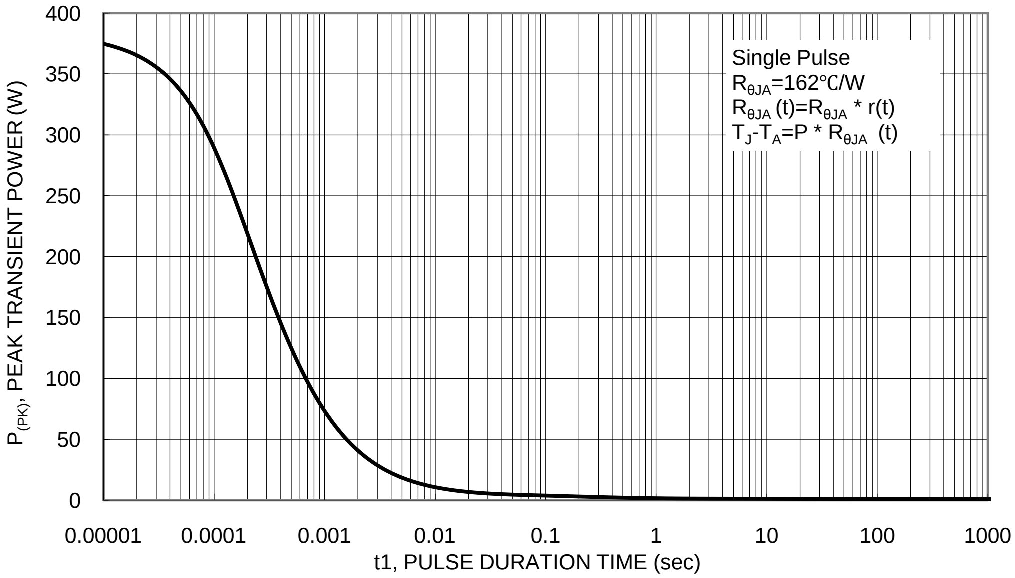


Fig. 13 Single Pulse Maximum Power Dissipation

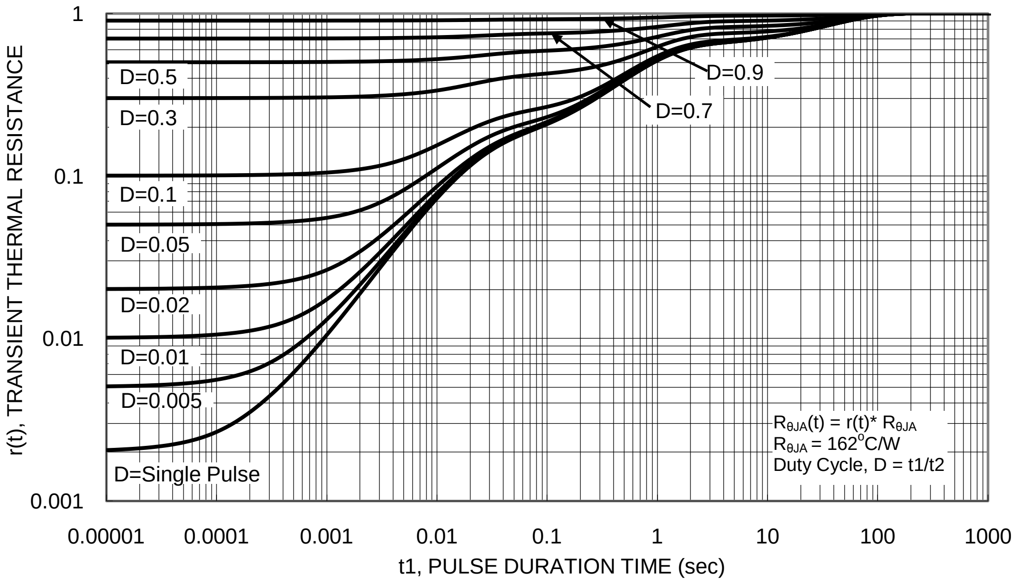
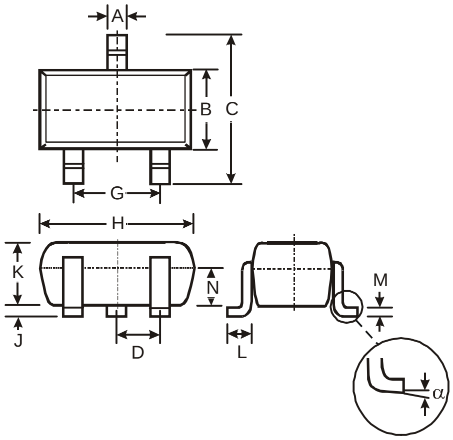


Fig. 14 Transient Thermal Resistance

Package Outline Dimensions

SC59



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Dim	**Min**	**Max**	**Typ**
A	0.35	0.50	0.38
B	1.50	1.70	1.60
C	2.70	3.00	2.80
D	-	-	0.95
G	-	-	1.90
H	2.90	3.10	3.00
J	0.013	0.10	0.05
K	1.00	1.30	1.10
L	0.35	0.55	0.40
M	0.10	0.20	0.15
N	0.70	0.80	0.75
α	0°	8°	-
All Dimensions in mm			

Suggested Pad Layout

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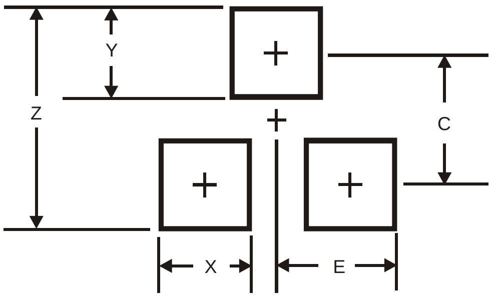

Dimensions	Value (in mm)
Z	3.4
X	0.8
Y	1.0
C	2.4
E	1.35