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

$V_{(BR)DSS}$	$R_{DS(ON)}$	Package	I_D T_A = +25°C
60V	V_{GS} = 10V	SOT-363	200mA

Features

- N-MOSFET with ESD Gate Protection
- N-MOSFET with Low On-Resistance ($R_{DS(ON)}$)
- Low V_f Schottky Diode
- Low Static, Switching, and Conduction Losses
- Good Dynamic Performance
- Surface Mount Package Suited for Automated Assembly

Description

The NK-NMSD200B01 improves the efficiency and reliability of DC-DC
controllers used in Voltage Regulator Modules (VRM) and can support a continuous maximum current of 200mA. It features an ESD protected discrete N-MOSFET with low on-resistance and a discrete Schottky diode with low forward drop.

The device reduces component count, consumes less space, and minimizes parasitic losses. The component devices can be used as a part of a circuit or as a stand-alone discrete device.

Applications

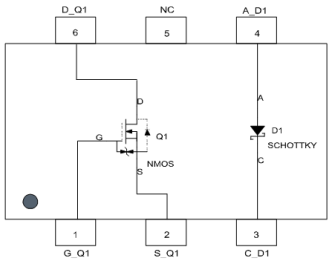
- Switching Voltage Regulators
- Power Management Applications

Mechanical Data

- Case: SOT-363
- Case Material: Molded Plastic. "Green Molding" Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020D
- Terminal Connections: See Diagram
- Terminals: Finish - Matte Tin annealed over Alloy 42 Lead-Frame. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.006 grams (Approximate)

SOT-363

Top View



Pin Configuration

Maximum Ratings @ T_A = 25°C unless otherwise specified

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P_d	200	mW
Output Current	I_{out}	200	mA

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

Sub-Component Device: ESD Protected N-Channel MOSFET (Q1)

Characteristic		Symbol	Value	Unit
Drain Source Voltage		V_{DSS}	60	V
Drain Gate Voltage (RGS <+ 1MOhm)		V_{DGR}	60	V
Gate Source Voltage	Continuous	V_{GSS}	+/-20	V
Drain Current (Note 5)	Continuous (V_{gs}=10V)	I_D	200	mA

Maximum Ratings @ T_A = 25°C unless otherwise specified

Sub-Component Device: Schottky Diode (D1)

Characteristic	Symbol	Value	Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	V_{RRM} V_{RWM} V_R	40	V
RMS Reverse Voltage	$V_{R(RMS)}$	28	V
Forward Continuous Current (Note 5)	I_{FM}	350	mA
Non-Repetitive Peak Forward Surge Current @ t<1.0 s	I_{FSM}	1.5	A

Thermal Characteristics

Characteristic	Symbol	Value	Unit
Junction Operation and Storage Temperature Range	T_j, T_{stg}	-55 to +150	°C
Thermal Resistance, Junction to Ambient Air (Note 5) (Equivalent to one heated junction of N-MOSFET)	$R_{\theta JA}$	625	°C/W

Note: 5. Device mounted on FR-4 PCB, 1 inch square, 2oz copper pad area.

Electrical Characteristics @ T_A = 25°C unless otherwise specified

Sub-Component Device: ESD Protected N-Channel MOSFET (Q1)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS (Note 6)						
Drain-Source Breakdown Voltage, BV_{DSS}	$V_{BR(DSS)}$	60	—	—	V	V_{GS} = 0V, I_D = 10μA
Zero Gate Voltage Drain Current (Drain Leakage Current)	I_{DSS}	—	—	1	μA	V_{GS} = 0V, V_{DS} = 60V
Gate Body Leakage Current, Forward	I_{GSSF}	—	—	10	μA	V_{GS} = 20V, V_{DS} = 0V
Gate Body Leakage Current, Reverse	I_{GSSR}	—	—	-10	μA	V_{GS} = -20 V, V_{DS} = 0V
ON CHARACTERISTICS (Note 6)						
Gate Source Threshold Voltage (Control Supply Voltage)	$V_{GS(th)}$	1	1.6	2.5	V	V_{DS} = V_{GS}=10V, I_D = 0.25mA
		1.1	1.8	3	V	V_{DS} = V_{GS} = 10V, I_D = 1mA
Static Drain-Source On-State Voltage	$V_{DS(on)}$	—	0.09	1.5	V	V_{GS} = 5V, I_D = 50mA
		—	0.62	1.25	V	V_{GS} = 10V, I_D = 500mA
Static Drain-Source On Resistance	$R_{DS\ (on)}$	—	1.6	3	Ω	V_{GS} = 5V, I_D= 50mA
		—	1.5	2		V_{GS} = 10V, I_D = 500mA
Forward Transconductance	g_{FS}	80	420	—	mS	V_{DS} >=2*$V_{DS(ON)}$, I_D=200mA
Dynamic Characteristics						
Input Capacitance	C_{iss}	—	—	50	pF	V_{DS} = 25V, V_{GS} = 0V, f = 1MHz
Output Capacitance	C_{oss}	—	—	25	pF	
Reverse Transfer Capacitance	C_{rss}	—	—	5	pF	
Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	—	—	20	ns	—
Turn-Off Delay Time	$t_{d(off)}$	—		40	ns	—
Drain-Source (Body) Diode Characteristics and Maximum Ratings						
Drain-Source Diode Forward On-Voltage	V_{SD}	—	0.88	1.5	V	V_{GS} = 0V, I_S = 300 mA

Electrical Characteristics @ T_A = 25°C unless otherwise specified

Sub-Component Device: Schottky Barrier Diode (D1)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Reverse Breakdown Voltage (Note 6)	$V_{(BR)R}$	40	—	—	V	I_R = 10μA
Forward Voltage Drop (Note 6)	V_{FM}	—	—	0.37	V	I_F =20mA
		—	—	0.6		I_F =200mA
Peak Reverse Current (Note 6)	I_{RM}	—	—	5	μA	V_R = 30V
Total Capacitance	C_T	—	39	—	pF	V_R = 0V, f = 1.0 MHz
Reverse Recovery Time	t_{rr}	—	10	—	ns	I_F=I_R= 30 mA, I_{rr} = 0.1xI_R, R_L= 100 Ω

Note: 6. Short duration pulse test used to minimize self-heating effect.

Typical Characteristics

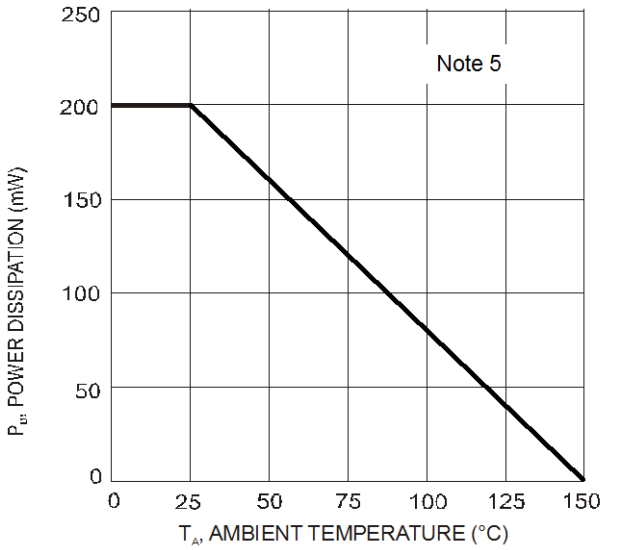


Fig. 1 Max Power Dissipation vs. Ambient Temperature

Typical N-Channel Characteristics

Sub-Component Device: MOSFET-Q1 (ESD Protected)

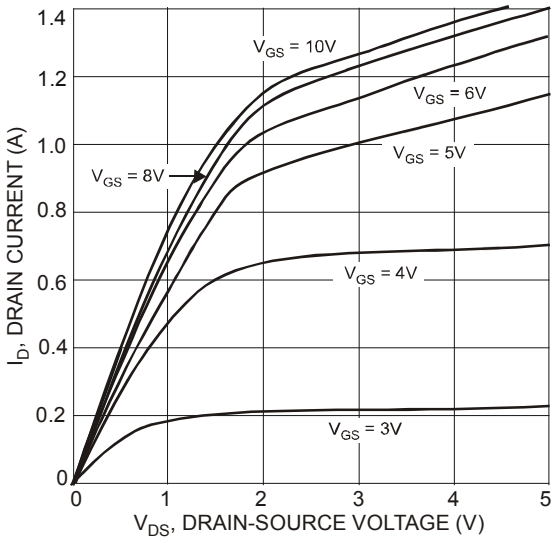


Fig. 2 Output Characteristics

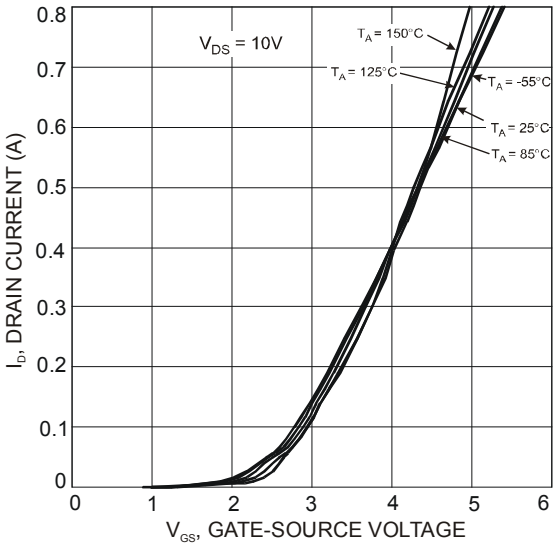


Fig. 3 Transfer Characteristics

Typical N-Channel Characteristics (cont.)

Sub-Component Device: MOSFET-Q1 (ESD Protected)

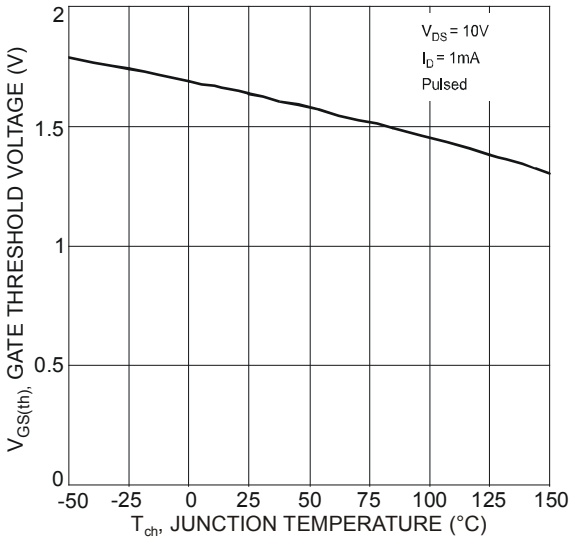


Fig. 4 Gate Threshold Voltage vs. Junction Temperature

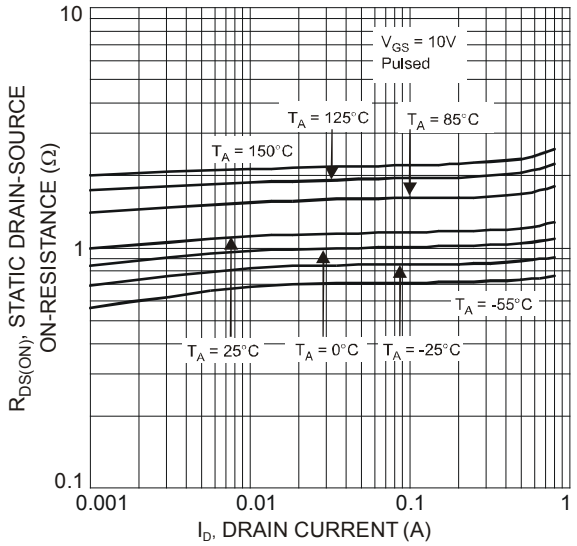


Fig. 5 Static Drain-Source On-Resistance vs. Drain Current

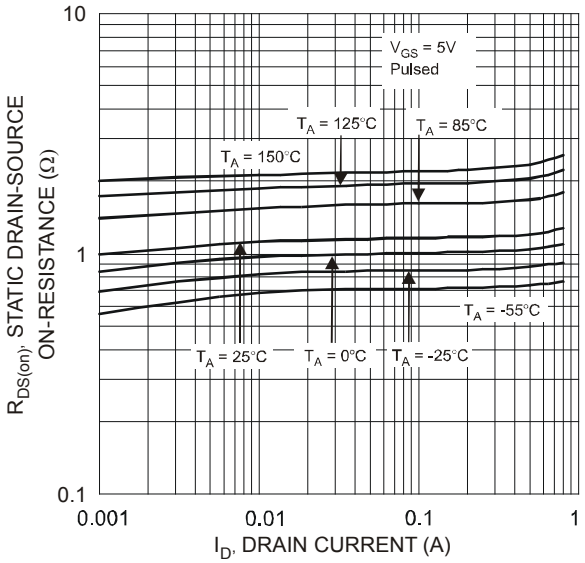


Fig. 6 Static Drain-Source On-Resistance vs. Drain Current

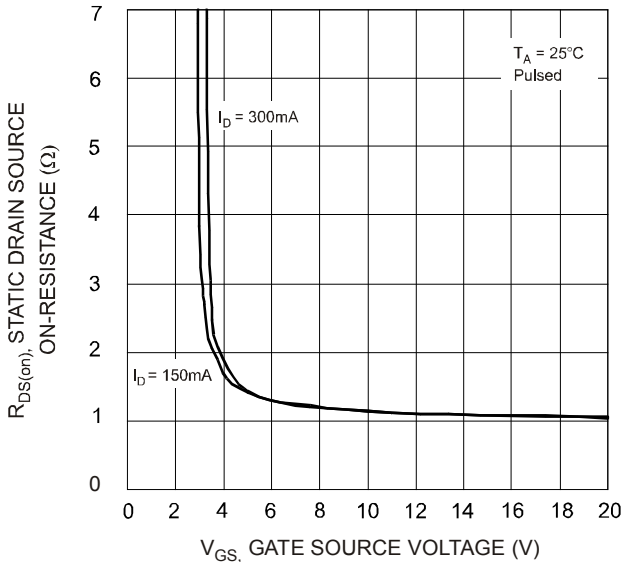


Fig. 7 Static Drain-Source On-Resistance vs. Gate-Source Voltage

Typical N-Channel Characteristics (cont.)

Sub-Component Device: MOSFET-Q1 (ESD Protected)

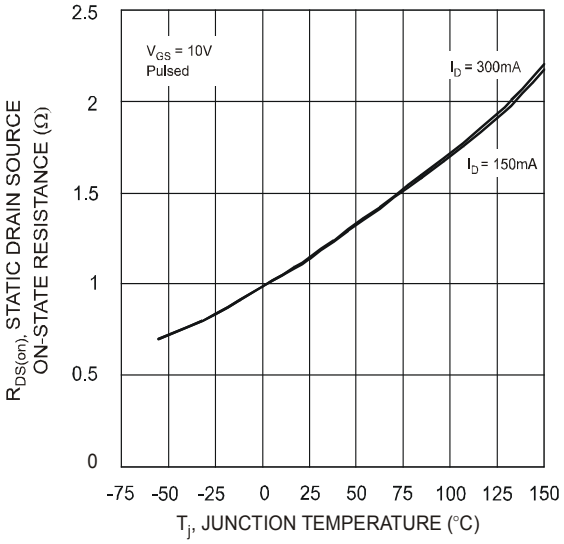


Fig. 8 Static Drain-Source On-State Resistance vs. Junction Temperature

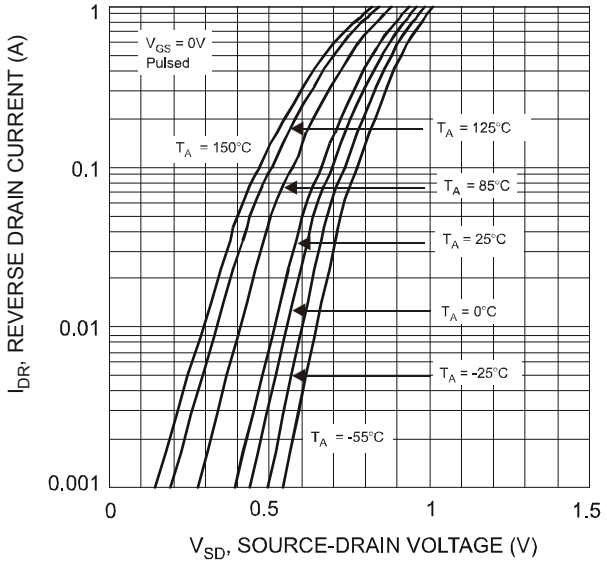


Fig. 9 Reverse Drain Current vs. Source-Drain Voltage

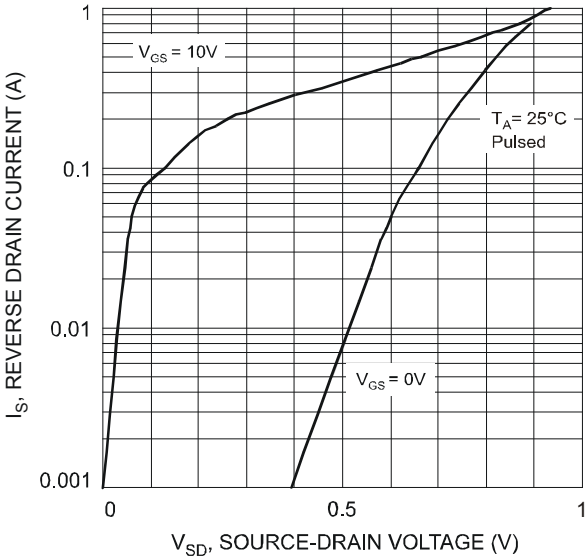


Fig. 10 Reverse Drain Current vs. Body Diode Forward Voltage

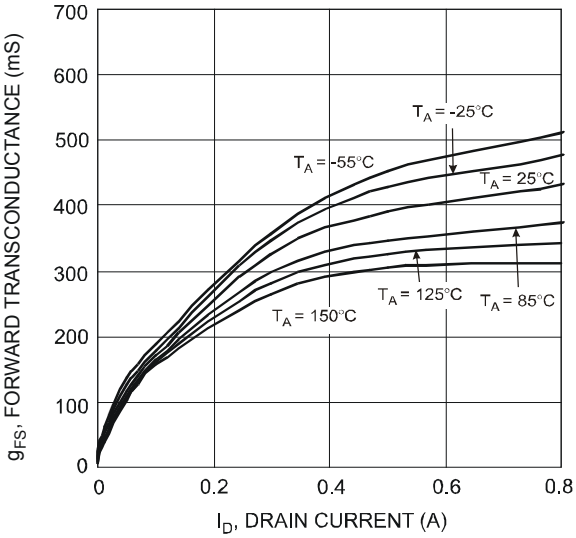


Fig. 11 Forward Transconductance vs. Drain Current (V_{DS}>I_D *$R_{DS(ON)}$)

Typical Characteristics

Sub-Component Device: Schottky Barrier Diode (D1)

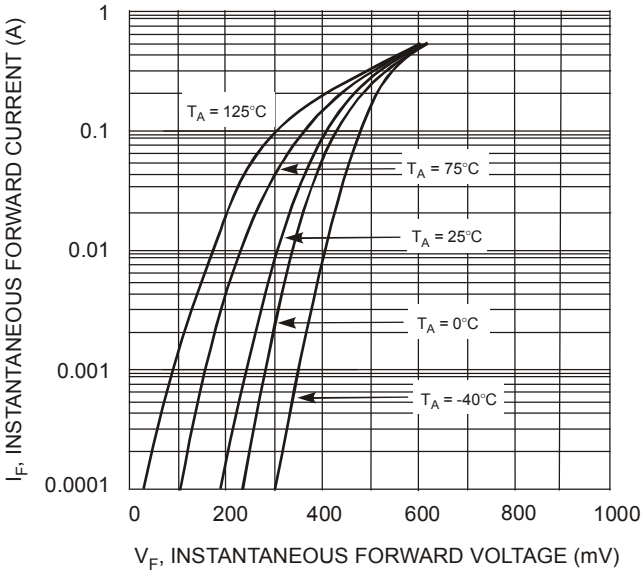


Fig. 12 Forward Characteristics

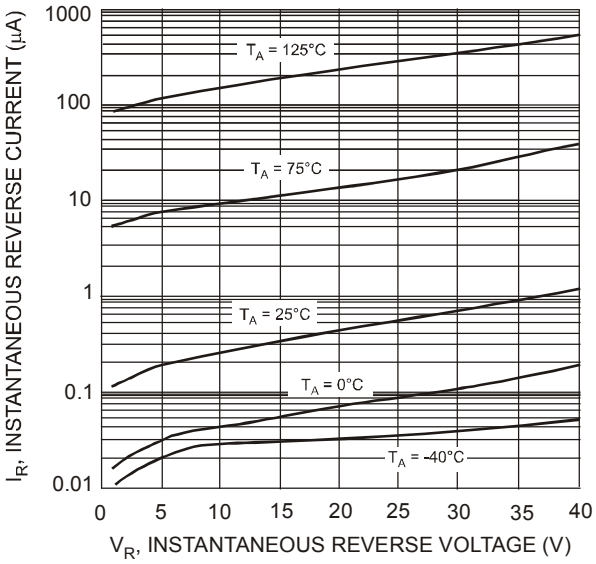


Fig. 13 Reverse Characteristics

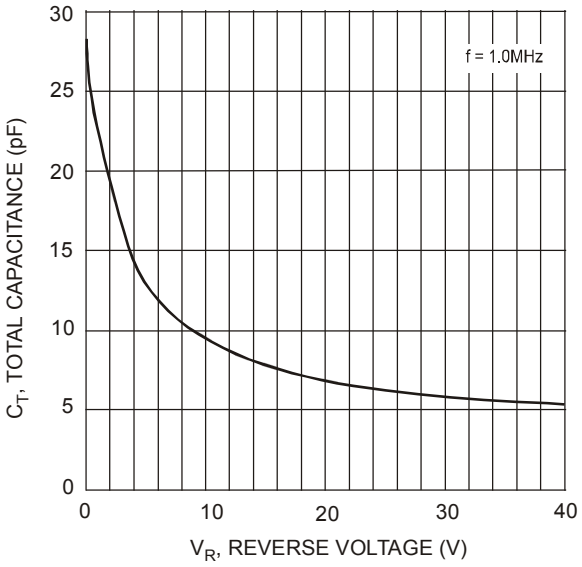


Fig. 14 Total Capacitance vs. Reverse Voltage

Package Outline Dimensions

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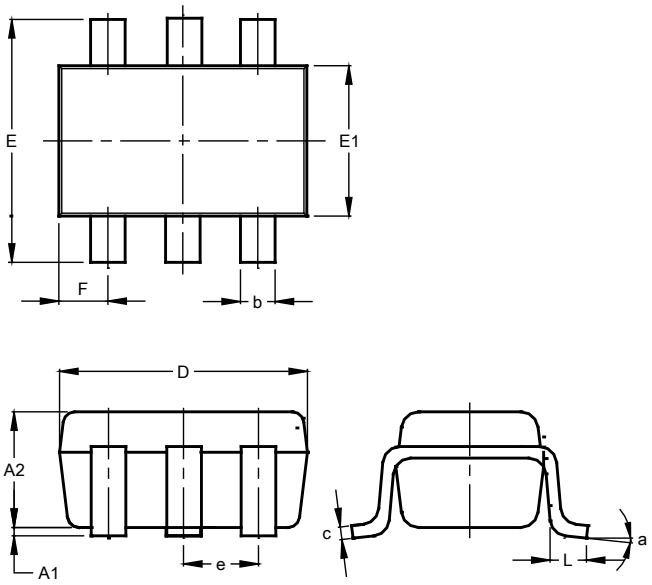

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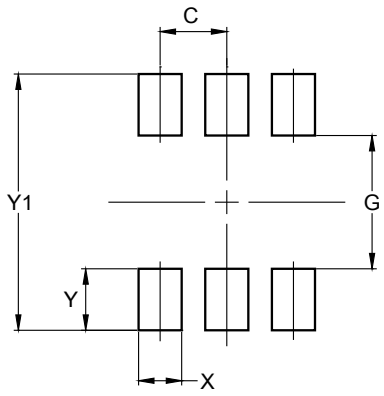
Dim	**Min**	**Max**	**Typ**
A1	0.00	0.10	0.05
A2	0.90	1.00	0.95
b	0.10	0.30	0.25
c	0.10	0.22	0.11
D	1.80	2.20	2.15
E	2.00	2.20	2.10
E1	1.15	1.35	1.30
e	0.650 BSC		
F	0.40	0.45	0.425
L	0.25	0.40	0.30
a	0°	8°	--
All Dimensions in mm			

Suggested Pad Layout

SOT363



Dimensions	Value (in mm)
C	0.650
G	1.300
X	0.420
Y	0.600
Y1	2.500