



## COMPLIMENTARY PAIR ENHANCEMENT MODE MOSFETS

This space-efficient device contains an electrically-isolated complimentary pair of enhancement-mode MOSFETs (one N-channel and one P-channel). It comes in a very small SOT-363 (SC70-6L) package. This device is ideal for portable applications where board space is at a premium.

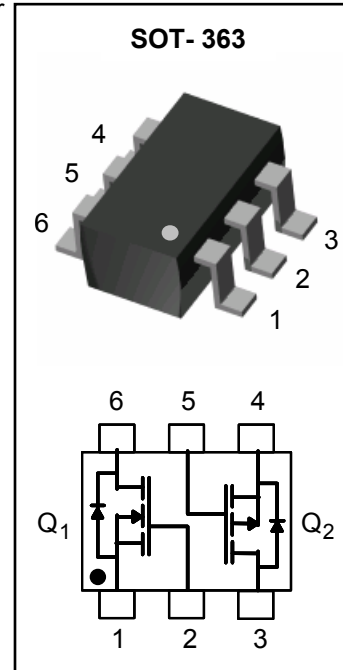
### FEATURES

- Complimentary Pairs
- Low On-Resistance
- Low Gate Threshold Voltage
- Fast Switching
- In compliance with EU RoHS 2002/95/EC directives

### APPLICATIONS

- Switching Power Supplies
- Hand-Held Computers, PDAs

MARKING CODE: S82



### MAXIMUM RATINGS - TOTAL DEVICE $T_J = 25^\circ\text{C}$ Unless otherwise noted

Rating	Symbol	Value	Units
Total Power Dissipation (Note 1)	$P_D$	200	mW
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

### MAXIMUM RATINGS N - CHANNEL - $Q_1$ , 2N7002 $T_J = 25^\circ\text{C}$ Unless otherwise noted

Rating	Symbol	Value	Units
Drain-Source Voltage	$V_{DSS}$	60	V
Drain-Gate Voltage $R_{GS} < 1.0\text{Mohm}$	$V_{DGR}$	60	V
Gate-Source Voltage - Continuous	$V_{GSS}$	$\pm 20$	V
Drain Current - Continuous (Note 1)	$I_D$	115	mA

### MAXIMUM RATINGS P - CHANNEL - $Q_2$ , BSS84 $T_J = 25^\circ\text{C}$ Unless otherwise noted

Rating	Symbol	Value	Units
Drain-Source Voltage	$V_{DSS}$	-50	V
Drain-Gate Voltage $R_{GS} < 20\text{Kohm}$	$V_{DGR}$	-50	V
Gate-Source Voltage - Continuous	$V_{GSS}$	$\pm 20$	V
Drain Current - Continuous (Note 1)	$I_D$	130	mA

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Units
Thermal Resistance, Junction to Ambient (Note 1)	$R_{thja}$	625	$^\circ\text{C/W}$

Note 1. FR-5 board 1.0 x 0.75 x 0.062 inch with minimum recommended pad layout



## Electrical Characteristics - N-CHANNEL - Q<sub>1</sub>, 2N7002 $T_J = 25^\circ\text{C}$ Unless otherwise noted

### OFF CHARACTERISTICS (Note 2)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D = 10\mu\text{A}, V_{GS} = 0\text{V}$	60	80	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 60\text{V}, V_{GS} = 0$ $T_J = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$	-	-	1.0	$\mu\text{A}$
Gate-Body Leakage	$I_{GSS}$	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$	-	-	$\pm 10$	nA

### ON CHARACTERISTICS (Note 2)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	1.0	1.6	2.5	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 5\text{V}, I_D = 0.05\text{A}$ $V_{GS} = 10\text{V}, I_D = 0.5\text{A}$	-	1.8	4.5	Ohms
On-State Drain Current	$I_{D(on)}$	$V_{GS} = 10\text{V}, V_{DS} = 7.5\text{V}$	0.5	1.65	-	A
Forward Transconductance	$g_{FS}$	$V_{DS} = 10\text{V}, I_D = 0.2\text{A}$	0.08	-	-	S

### DYNAMIC CHARACTERISTICS

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Input Capacitance	$C_{iss}$	$V_{DS} = 25\text{V},$ $V_{GS} = 0\text{V},$ $f = 1.0\text{MHz}$	-	-	50	pF
Output Capacitance	$C_{oss}$		-	-	25	pF
Reverse Transfer Capacitance	$C_{rss}$		-	-	5.0	pF

### SWITCHING CHARACTERISTICS

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Turn-On Delay Time	$t_{D(on)}$	$V_{DD} = 30\text{V}, I_D = 0.2\text{A}, R_L = 150\text{ohm}$ $R_{GEN} = 25\text{ohm}, V_{GEN} = 10\text{V}$	-	-	20	ns
Turn-Off Delay Time	$t_{D(off)}$		-	-	20	ns

Note 2. Short duration test pulse used to minimize self-heating



## Electrical Characteristics - P-CHANNEL - Q<sub>2</sub>, BSS84 T<sub>J</sub> = 25°C Unless otherwise noted

### OFF CHARACTERISTICS (Note 3)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> = -250μA, V <sub>GS</sub> = 0V	-50	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = -50V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 25°C	-	-	-15	μA
		V <sub>DS</sub> = -50V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C	-	-	-60	
		V <sub>DS</sub> = -25V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 25°C	-	-	-0.1	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	-	-	±10	nA

### ON CHARACTERISTICS (Note 3)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -1mA	-0.8	1.44	-2.0	V
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = -5V, I <sub>D</sub> = -0.1A	-	3.8	10	Ohms
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = -25V, I <sub>D</sub> = -0.1A	0.05	-	-	S

### DYNAMIC CHARACTERISTICS

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = -25V, V <sub>GS</sub> = 0V, f = 1.0MHz	-	-	45	pF
Output Capacitance	C <sub>oss</sub>		-	-	25	pF
Reverse Transfer Capacitance	C <sub>rss</sub>		-	-	12	pF

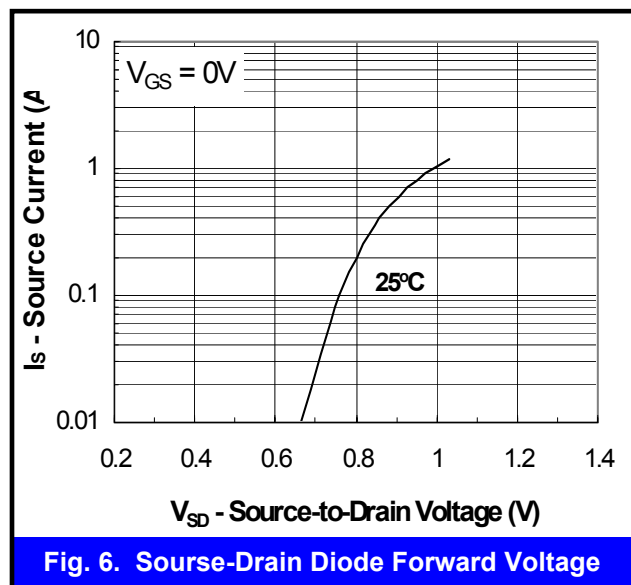
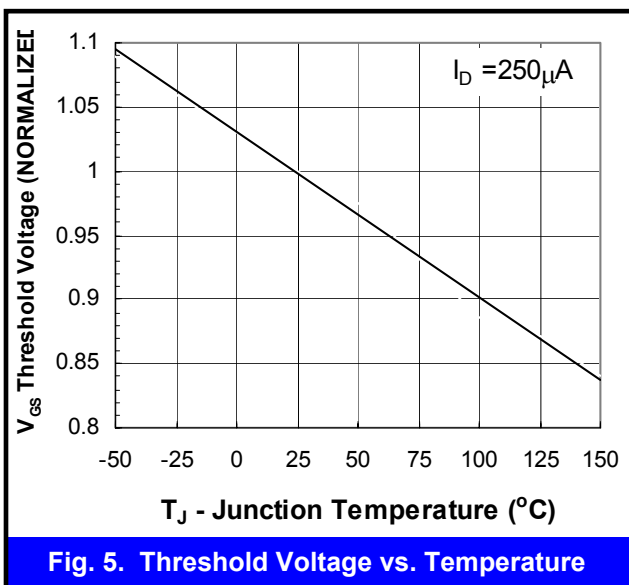
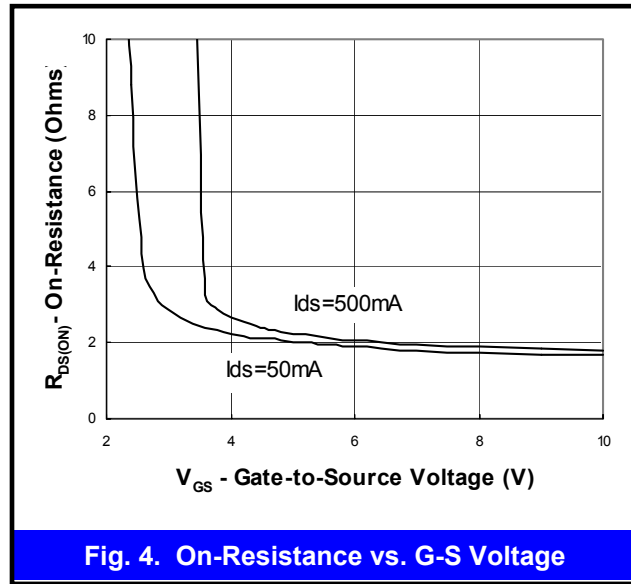
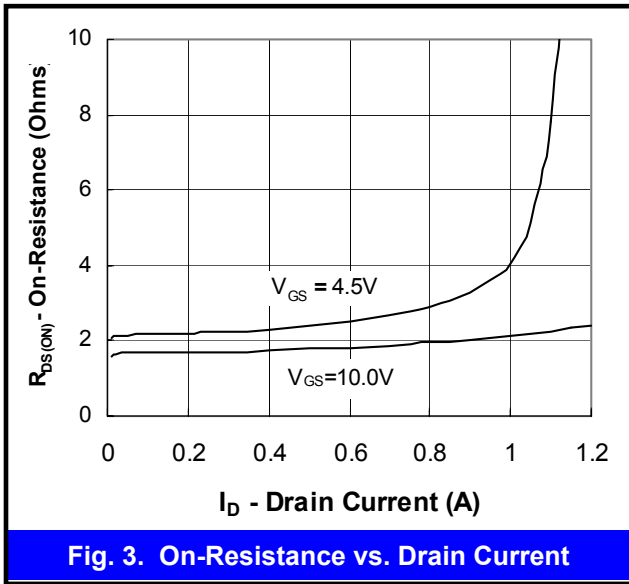
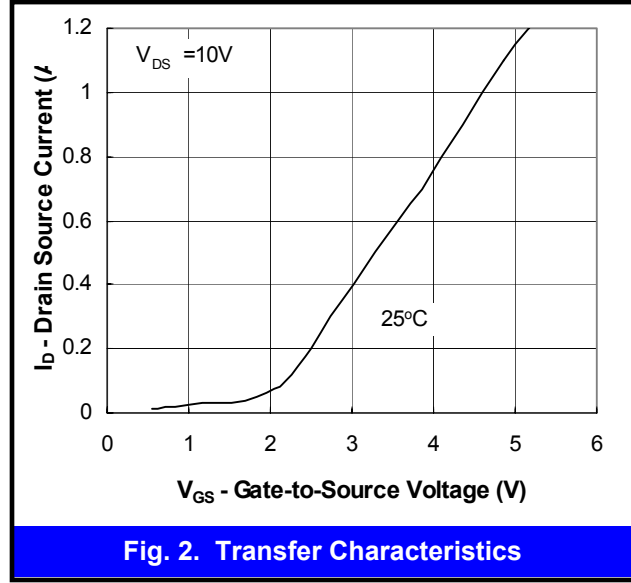
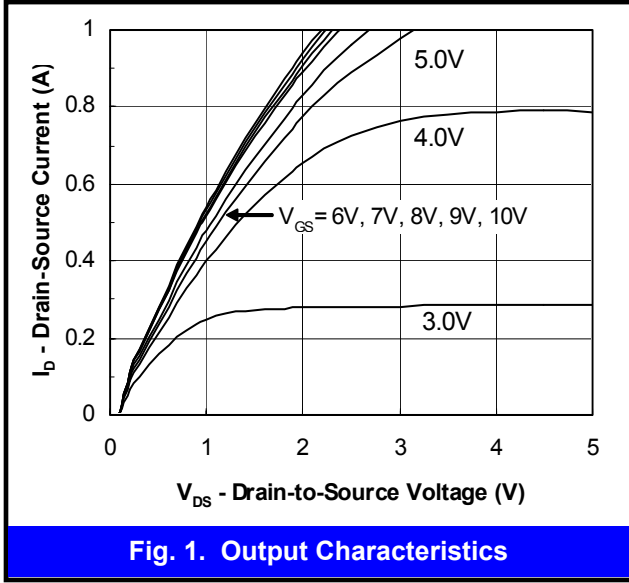
### SWITCHING CHARACTERISTICS

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Turn-On Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> = -30V, I <sub>D</sub> = -0.27A, R <sub>GEN</sub> = 50ohm, V <sub>GS</sub> = -10V	-	7.5	-	ns
Turn-Off Delay Time	t <sub>D(OFF)</sub>		-	25	-	ns

Note 3. Short duration test pulse used to minimize self-heating

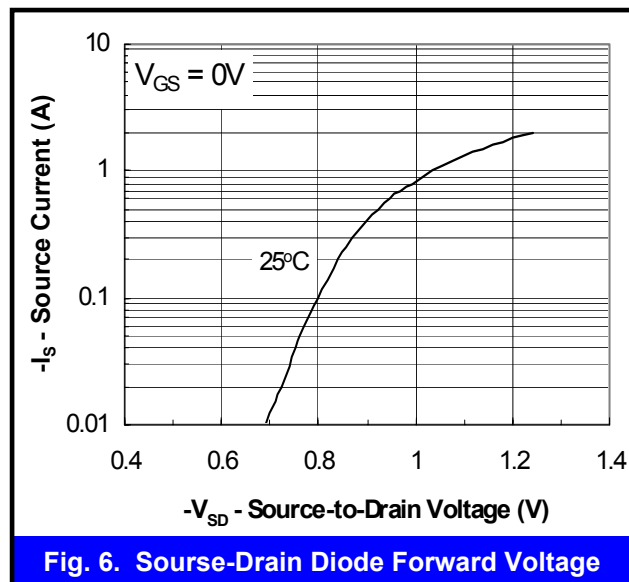
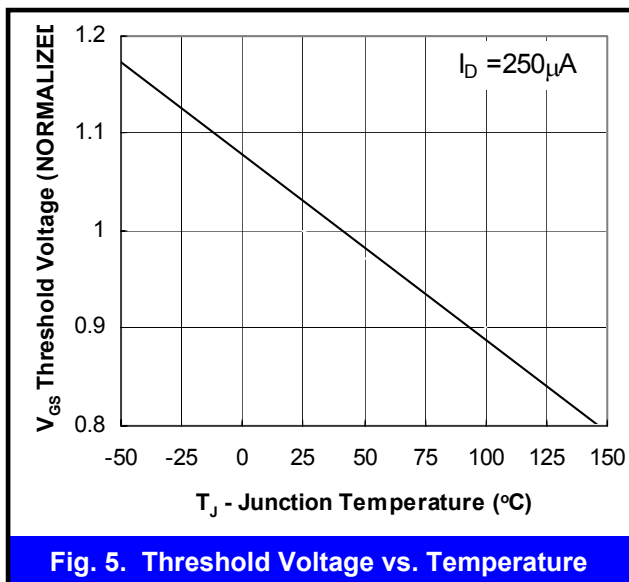
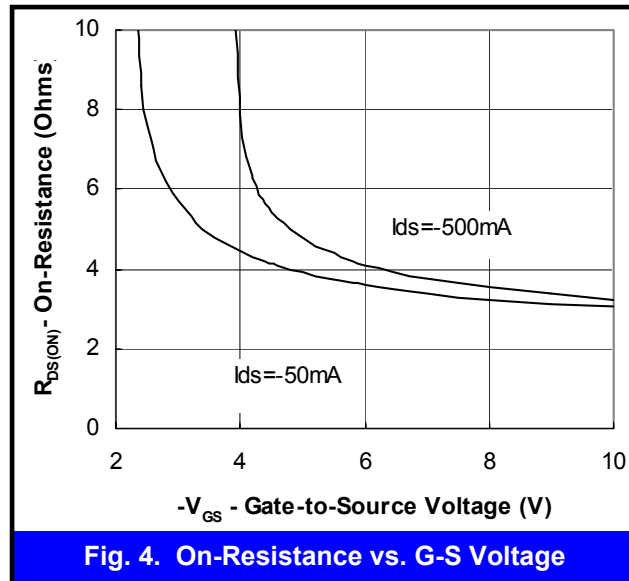
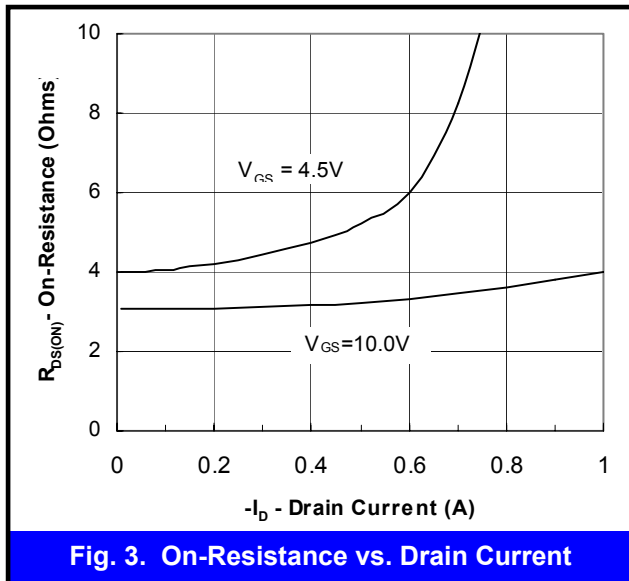
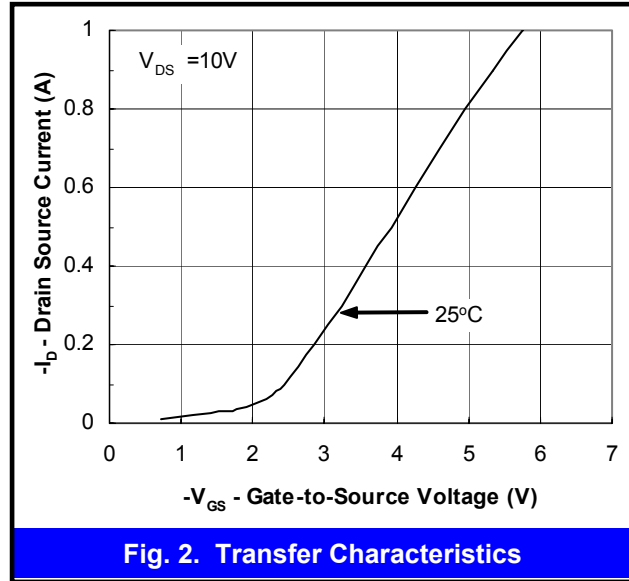
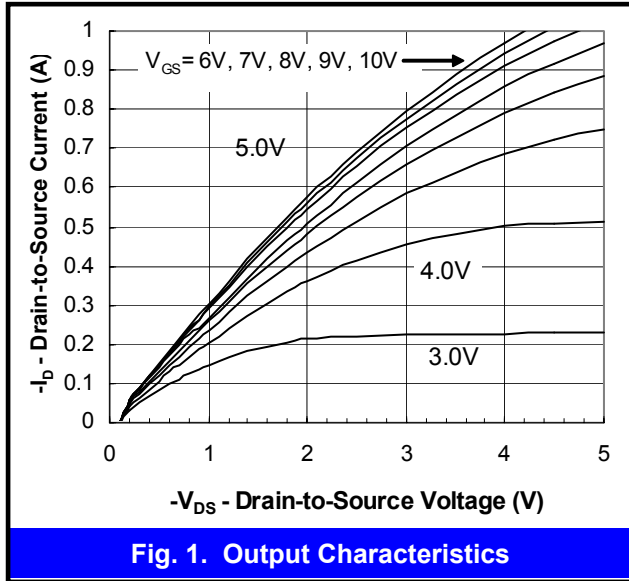


## Typical Characteristics Curves - N-Channel - Q<sub>1</sub>, 2N7002 T<sub>J</sub> = 25°C Unless otherwise noted





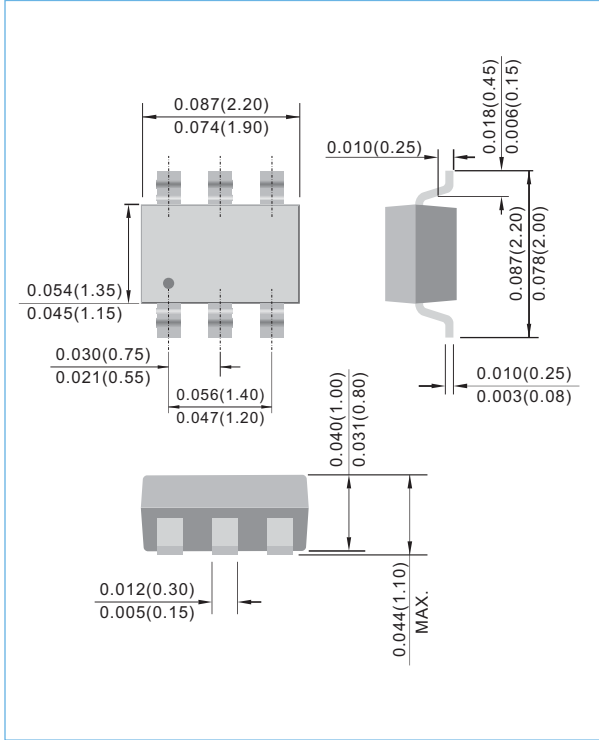
## Electrical Characteristic Curves - P-Channel - $Q_2$ , BSS84 $T_J = 25^\circ\text{C}$ Unless otherwise noted



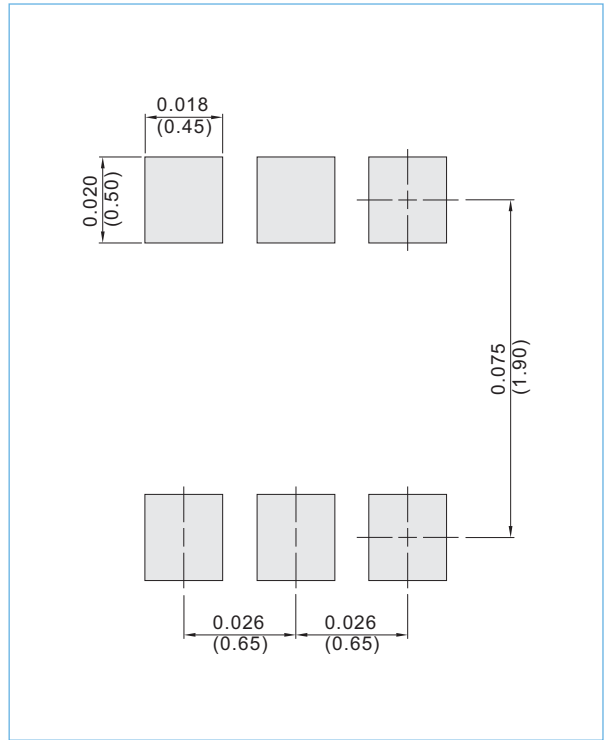


## PACKAGE LAYOUT AND SUGGESTED PAD DIMENSIONS

**SOT-363** Unit : inch(mm)



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## ORDERING INFORMATION

BSS8402DW T/R7: 7 inch reel, 3K units per reel, Pin 1 towards tape sprocket holes

BSS8402DW T/R7-R: 7 inch reel, 3K units per reel, Pin 1 away from tape sprocket holes

BSS8402DW T/R13: 13 inch reel, 10K units per reel, Pin 1 towards tape sprocket holes

BSS8402DW T/R13-R: 13 inch reel, 10K units per reel, Pin 1 away from tape sprocket holes

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