



BSS8402DW

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.

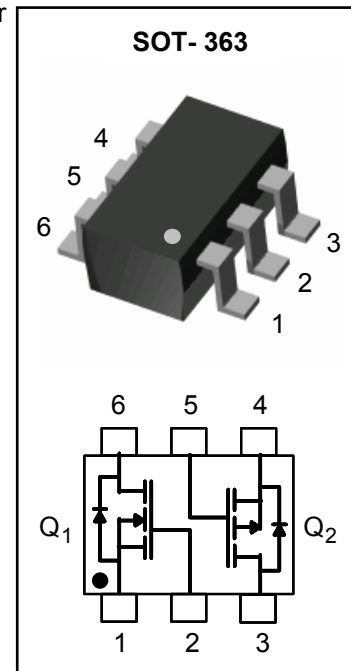
FEATURES

- Complimentary Pairs
- Low On-Resistance
- Low Gate Threshold Voltage
- Fast Switching
- Available in lead-free plating (100% matte tin finish)

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}	± 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}	± 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



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Electrical Characteristics - N-CHANNEL - Q₁, 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	μA
Gate-Body Leakage	I_{GSS}	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$	-	-	± 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	$t_{D(on)}$	$V_{DD} = 30\text{V}, I_D = 0.2\text{A}, R_L = 150\text{ohm}$	-	-	20	ns
Turn-Off Delay Time	$t_{D(off)}$	$R_{GEN} = 25\text{ohm}, V_{GEN} = 10\text{V}$	-	-	20	ns

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



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Electrical Characteristics - P-CHANNEL - Q₂, BSS84 $T_J = 25^\circ\text{C}$ Unless otherwise noted

OFF CHARACTERISTICS (Note 3)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D = -250\mu\text{A}, V_{GS} = 0\text{V}$	-50	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -50\text{V}, V_{GS} = 0\text{V}, T_J = 25^\circ\text{C}$	-	-	-15	μA
		$V_{DS} = -50\text{V}, V_{GS} = 0\text{V}, T_J = 125^\circ\text{C}$	-	-	-60	
		$V_{DS} = -25\text{V}, V_{GS} = 0\text{V}, T_J = 25^\circ\text{C}$	-	-	-0.1	
Gate-Body Leakage	I_{GSS}	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$	-	-	± 10	nA

ON CHARACTERISTICS (Note 3)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -1\text{mA}$	-0.8	1.44	-2.0	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS} = -5\text{V}, I_D = -0.1\text{A}$	-	3.8	10	Ohms
Forward Transconductance	g_{FS}	$V_{DS} = -25\text{V}, I_D = -0.1\text{A}$	0.05	-	-	S

DYNAMIC CHARACTERISTICS

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Input Capacitance	C_{iss}	$V_{DS} = -25\text{V},$ $V_{GS} = 0\text{V},$ $f = 1.0\text{MHz}$	-	-	45	pF
Output Capacitance	C_{oss}		-	-	25	pF
Reverse Transfer Capacitance	C_{rss}		-	-	12	pF

SWITCHING CHARACTERISTICS

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Turn-On Delay Time	$t_{D(ON)}$	$V_{DD} = -30\text{V}, I_D = -0.27\text{A},$ $R_{GEN} = 50\text{ohm}, V_{GS} = -10\text{V}$	-	7.5	-	ns
Turn-Off Delay Time	$t_{D(OFF)}$		-	25	-	ns

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



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Typical Characteristics Curves - N-Channel - Q₁, 2N7002 T_J = 25°C Unless otherwise noted

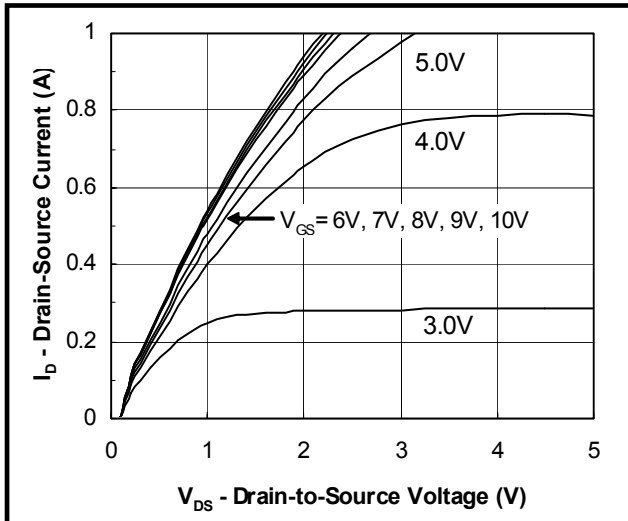


Fig. 1. Output Characteristics

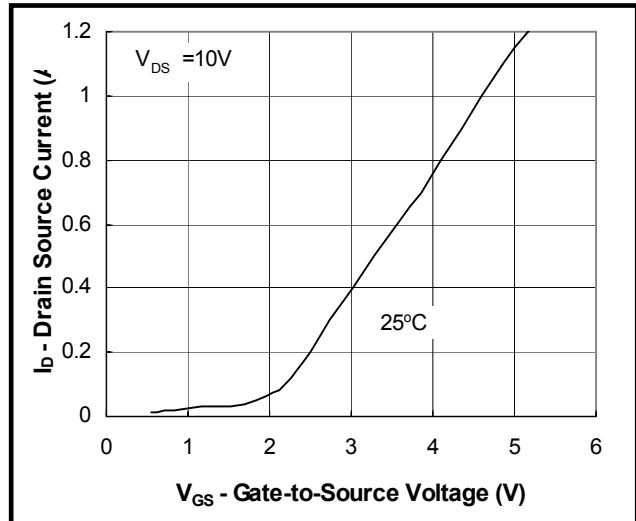


Fig. 2. Transfer Characteristics

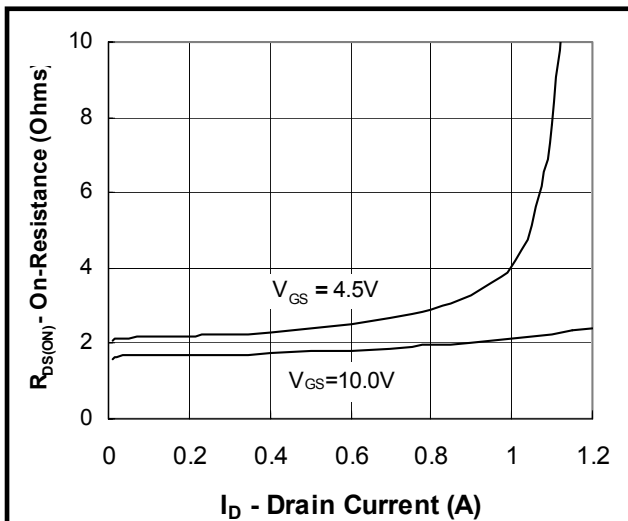


Fig. 3. On-Resistance vs. Drain Current

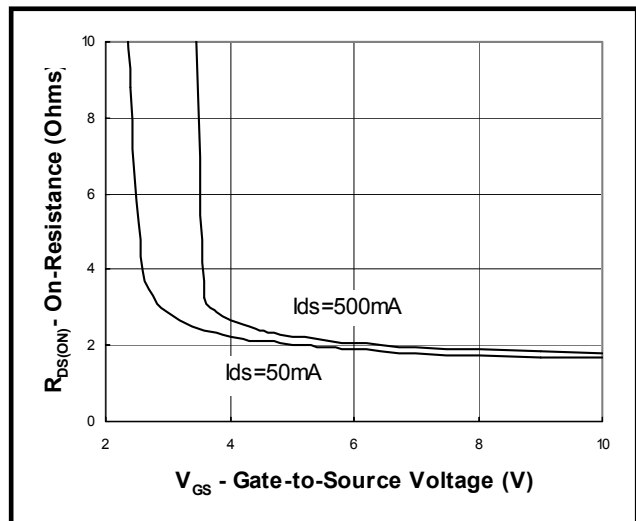


Fig. 4. On-Resistance vs. G-S Voltage

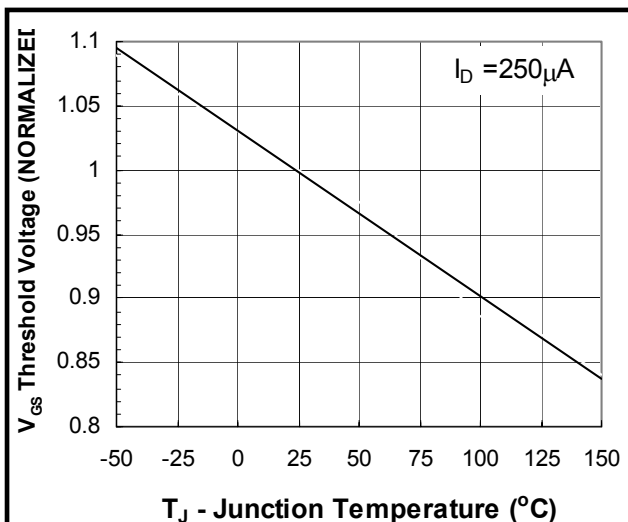


Fig. 5. Threshold Voltage vs. Temperature

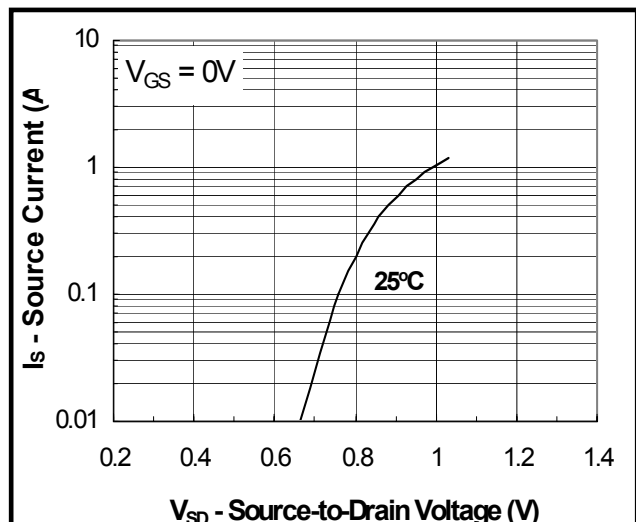


Fig. 6. Source-Drain Diode Forward Voltage



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Electrical Characteristic Curves - P-Channel - Q₂, BSS84 T_J = 25°C Unless otherwise noted

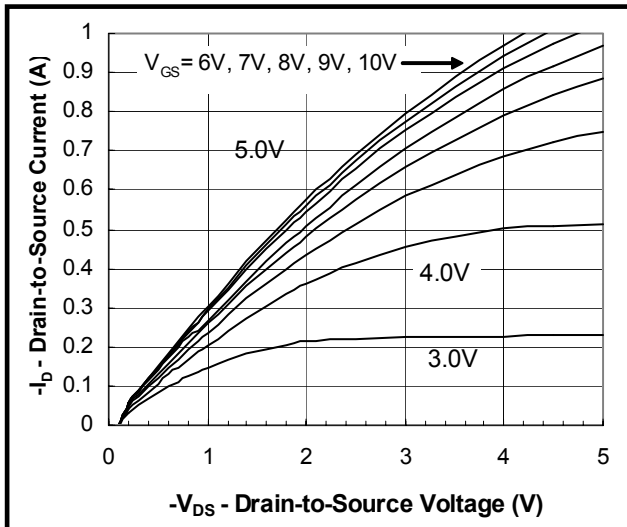


Fig. 1. Output Characteristics

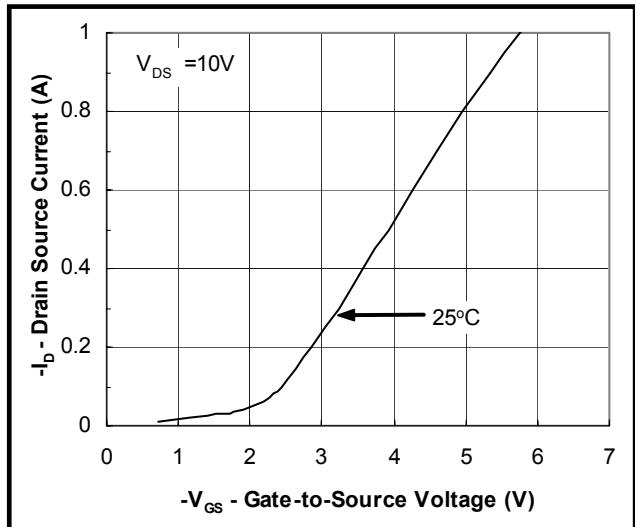


Fig. 2. Transfer Characteristics

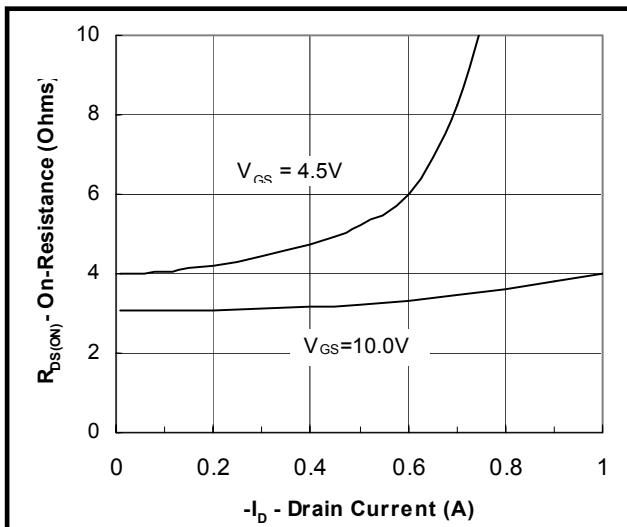


Fig. 3. On-Resistance vs. Drain Current

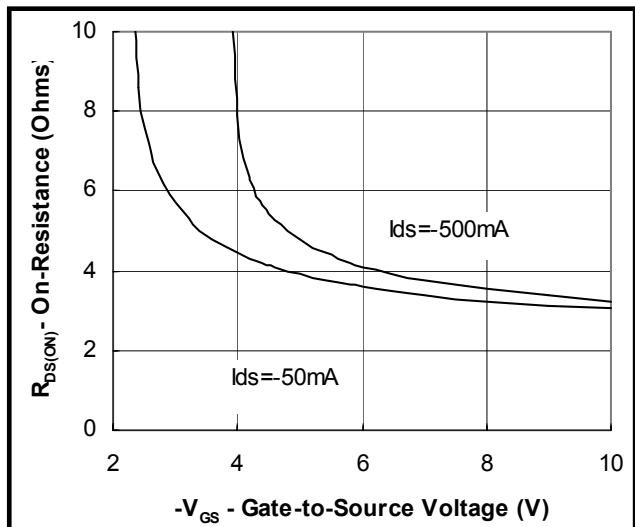


Fig. 4. On-Resistance vs. G-S Voltage

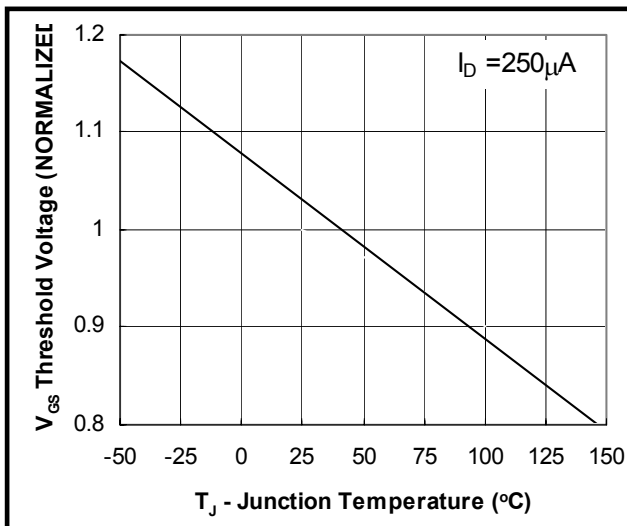


Fig. 5. Threshold Voltage vs. Temperature

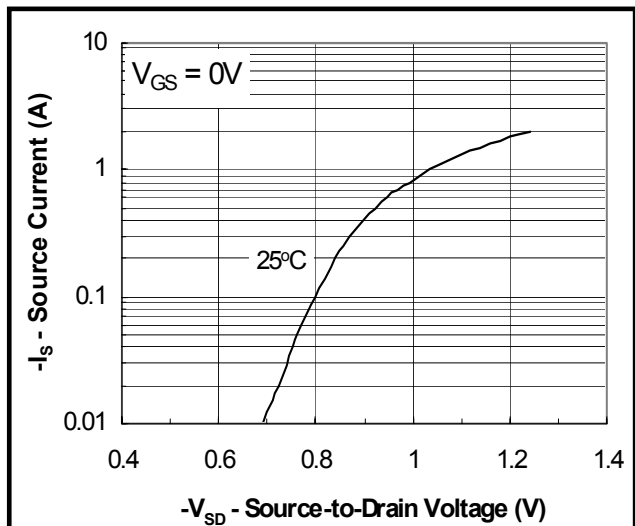
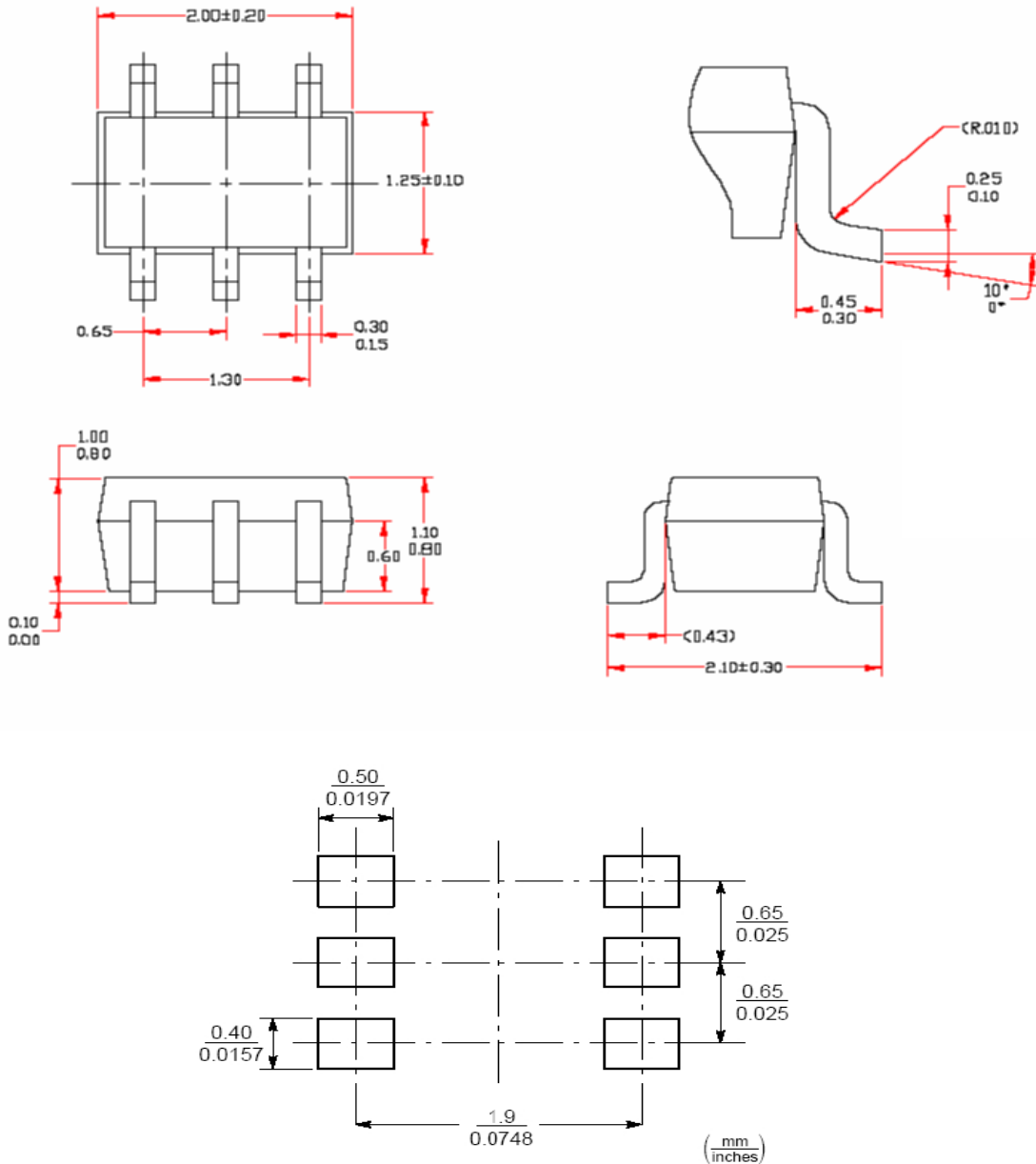


Fig. 6. Source-Drain Diode Forward Voltage



PACKAGE LAYOUT AND SUGGESTED PAD DIMENSIONS



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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