TOPAZ SEMICONDUCTOR

SD210, SD211, SD212, SD213, SD214, SD215

N-CHANNEL ENHANCEMENT-MODE D-MOS FET SWITCHES

ORDERING INFORMATION

TO-206AF (TO-72) Package	SD210DE	SD211DE	SD212DE	SD213DE	SD214DE	SD215DE
Shorting Rings	SD210DE/R	SD211DE/R	SD212DE/R	SD213DE/R	SD214DE/R	SD215DE/R
Sorted Chips in Carriers	SD210CHP	SD211CHP	SD212CHP	SD213CHP	SD214CHP	SD215CHP

FEATURES

- High Input to Output Isolation — 120dB typical
- Low feedthrough and feedback transients
- Low Inter-electrode Capacitances

APPLICATIONS

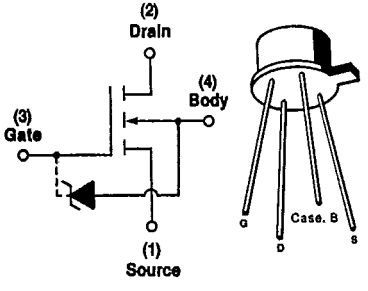
- +30V Switch Drivers — SD210, SD211
- ±10V Analog Switches — SD214, SD215
- ±5V Analog Switches — SD212, SD213

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C unless otherwise noted)

PARAMETER	SD210	SD211	SD212	SD213	SD214	SD215	UNIT
Breakdown Voltages							
V_{DS}	+30	+30	+10	+10	+20	+20	Vdc
V_{SD}	+10	+10	+10	+10	+20	+20	Vdc
V_{DB}	+30	+30	+15	+15	+25	+25	Vdc
V_{SB}	+15	+15	+15	+15	+25	+25	Vdc
V_{GS}	±40	−15	±40	−15	±40	−25	Vdc
		+25		+25		+30	Vdc
V_{GB}	±40	−0.3	±40	−0.3	±40	−0.3	Vdc
		+25		+25		+30	Vdc
V_{GD}	±40	−30	±40	−15	±40	−25	Vdc
		+25		+25		+30	Vdc

I_D	Continuous Drain Current	50mA
P_T	Power Dissipation (at or below T_C = +25°C)	1.2W
	Linear Derating Factor	12mW/°C
P_D	Power Dissipation (at or below T_A = +25°C)	300mW
	Linear Derating Factor	3.0mW/°C
T_j	Operating Junction Temperature Range	−55 to +125°C
T_s	Storage Temperature Range	−65 to +175°C

SCHEMATIC DIAGRAM

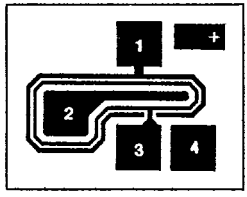


Body internally connected to Case.
Diode protection on SD211/SD213/SD215 only.

PACKAGE DIMENSIONS (TO-72) TO-206AF

(See Package 3)

CHIP CONFIGURATION



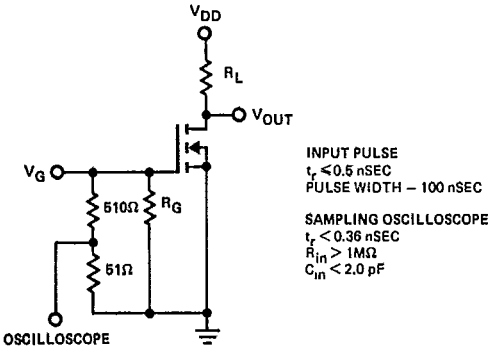
PAD
1—Source
2—Drain
3—Gate
4—Diode

For SD211/213/215CHP bond Gate and Diode to common backside contact.
Dimensions: .022 × .025 × .013 inches

ELECTRICAL CHARACTERISTICS (T_A = +25°C unless otherwise noted)

#		PARAMETER		SD210, SD211			SD212, SD213			SD214, SD215			UNIT	TEST CONDITIONS	
				MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX			
1	STATIC	BV_{DS} Drain-Source Breakdown Voltage		30	35								V	I_D = 10μA V_{GS} = V_{BS} = 0	
2				10	25		10	25		20	25		V	I_D = 10nA V_{GS} = V_{BS} = −5V	
3		BV_{SD} Source-Drain Breakdown Voltage		10			10			20			V	I_S = 10nA V_{GD} = V_{BD} = −5V	
4		BV_{DB} Drain-Substrate Breakdown Voltage		15			15			25			V	I_D = 10nA, V_{GB} = 0 Source OPEN	
5		BV_{SB} Source-Substrate Breakdown Voltage		15			15			25			V	I_S = 10μA, V_{GB} = 0 Drain OPEN	
6		$I_{D(off)}$ Drain-Source OFF Current				10			10				nA	V_{DS} = 10V	V_{GS} = V_{BS} = −5V
7												10	nA	V_{DS} = 20V	
8		$I_{S(off)}$ Source-Drain OFF Current				10			10				nA	V_{SD} = 10V	V_{GD} = V_{BD} = −5V
9												10	nA	V_{SD} = 20V	
10		I_{GBS} Gate-Body Leakage Current	SD210			0.1							nA	V_{GB} = ±40V	V_{DB} = V_{SB} = 0
11			SD212						0.1				nA		
12			SD214									0.1	nA		
13			SD211			10							μA	V_{GB} = 25V	
14			SD213						10				μA		
15			SD215									10	μA	V_{GB} = 30V	
16		$V_{GS(th)}$ Gate Threshold Voltage		0.5	1.0	2.0	0.1		2.0	0.1	1.0	2.0	V	V_{DS} = V_{GS}, I_D = 1μA, V_{SB} = 0	
17		$r_{DS(on)}$ Drain-Source ON Resistance			50	70		50	70		50	70	ohms	V_{GS} = 5V	I_D = 1mA
18					30	45		30	45		30	45	ohms	V_{GS} = 10V	V_{SB} = 0
19	DYNAMIC	g_{fs} Common-Source Forward Transcond.		10	12		10	12		10	12		mmhos	V_{DS} = 10V, I_D = 20mA f = 1KHz, V_{SB} = 0	
20		$C_{(gs+gd+gb)}$ Gate Node Capacitance			2.4	3.5		2.4	3.5		2.4	3.5	pF	V_{DS} = 10V V_{GS} = V_{BS} = −15V f = 1MHz	
21		$C_{(gd+db)}$ Drain Node Capacitance			1.3	1.5		1.3	1.5		1.3	1.5	pF		
22		$C_{(gs+sb)}$ Source Node Capacitance			3.5	4.0		3.5	4.0		3.5	4.0	pF		
23		$C_{(dg)}$ Reverse Transfer Capacitance			0.3	0.5		0.3	0.5		0.3	0.5	pF		
24		$t_{d(on)}$ Turn ON Delay Time			0.7	1.0		0.7	1.0		0.7	1.0	nSec	V_{DD} = 5V, $V_{G(on)}$ = 10V R_L = 5KΩ	
25		t_r Rise Time			0.8	1.0		0.8	1.0		0.8	1.0			
26		t_{off} Turn OFF Time			10			10			10				

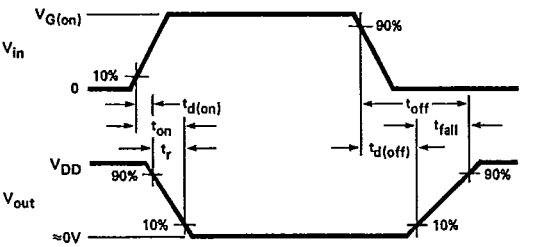
SWITCHING TIMES TEST CIRCUIT



INPUT PULSE
$t_r \leq 0.5$ nSEC
PULSE WIDTH – 100 nSEC

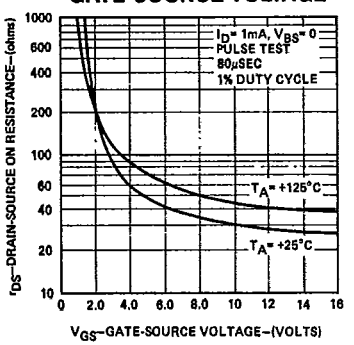
SAMPLING OSCILLOSCOPE
$t_r < 0.36$ nSEC
$R_{in} > 1M\Omega$
$C_{in} < 2.0$ pF

TEST WAVEFORMS

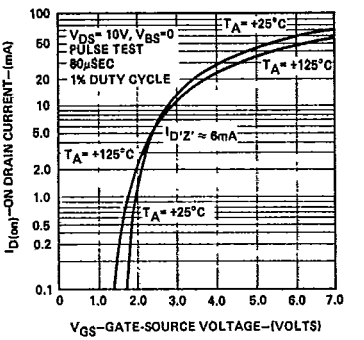


TYPICAL PERFORMANCE CHARACTERISTICS (T_A = +25°C unless otherwise specified)

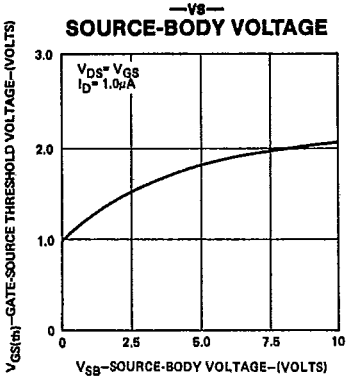
DRAIN-SOURCE ON RESISTANCE —vs— GATE-SOURCE VOLTAGE



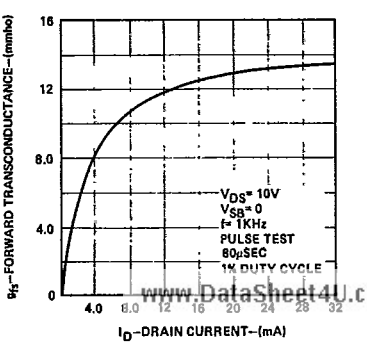
ON DRAIN CURRENT —vs— GATE-SOURCE VOLTAGE



GATE-SOURCE THRESHOLD VOLTAGE —vs— SOURCE-BODY VOLTAGE



FORWARD TRANSCONDUCTANCE —vs— ON DRAIN CURRENT

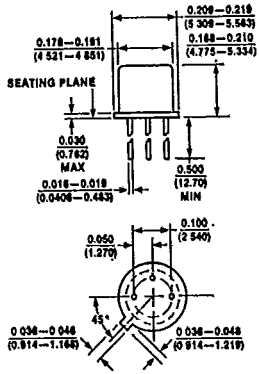


TOPAZ
SEMICONDUCTOR

PACKAGE DATA

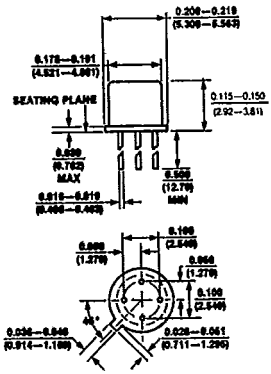
T-90-20 -
T-91-20

Package 1 (TO-18) TO-206AA



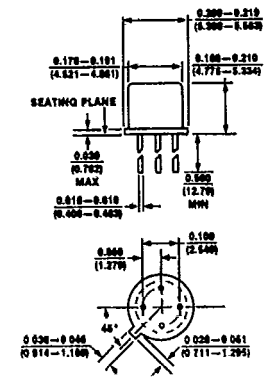
All Dimensions in inches and (millimeters)

Package 2 (TO-52) 4-Lead



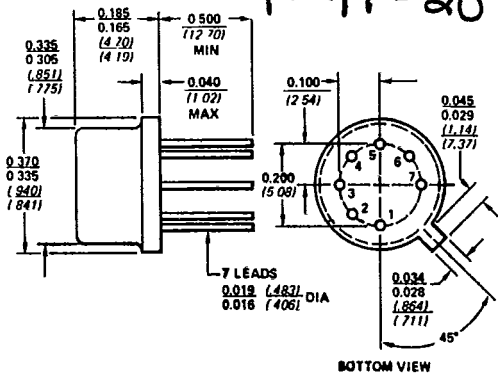
All Dimensions in inches and (millimeters)

Package 3 (TO-72) TO-206AF



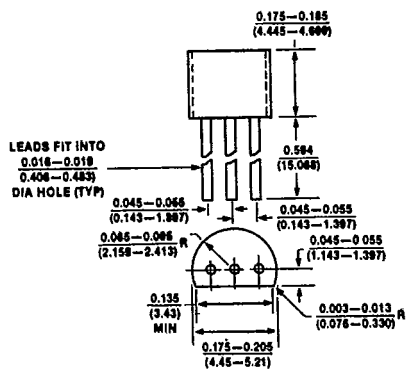
All Dimensions in inches and (millimeters)

Package 4 (TO-78)



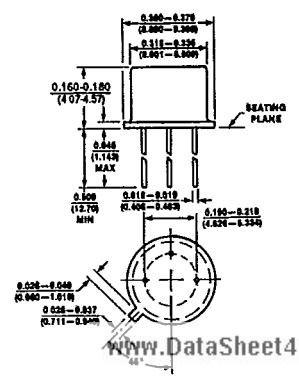
All Dimensions in inches and (millimeters)

Package 5 (TO-92) TO-226AA



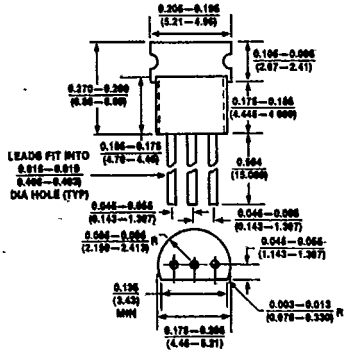
All Dimensions in inches and (millimeters)

Package 6 (TO-39) TO-205AF



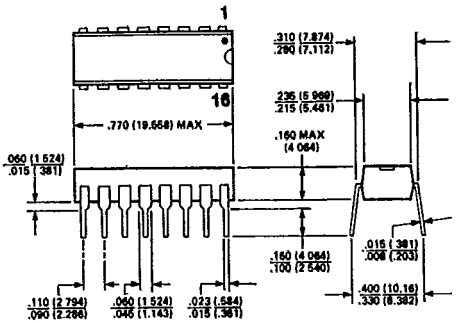
All Dimensions in inches and (millimeters)

Package 7 (TO-237)



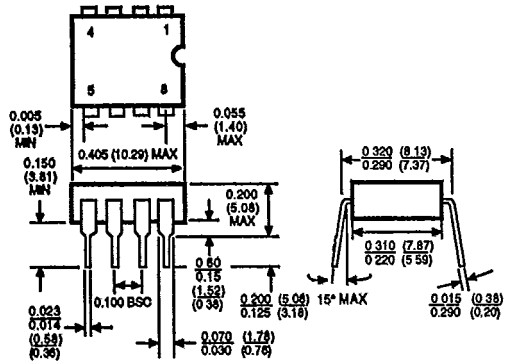
All Dimensions In Inches and (millimeters)

Package 10 16-Pin Plastic Dip



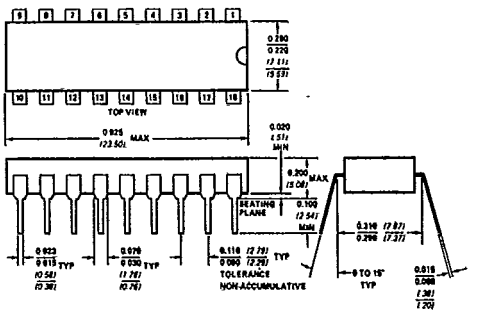
All Dimensions In Inches and (millimeters)

Package 8 8-Pin Plastic Dip



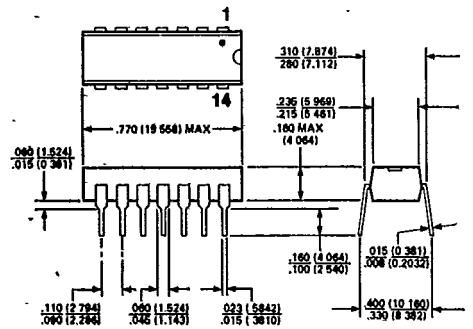
All Dimensions In Inches and (millimeters)

Package 11 18-Pin Plastic Dip



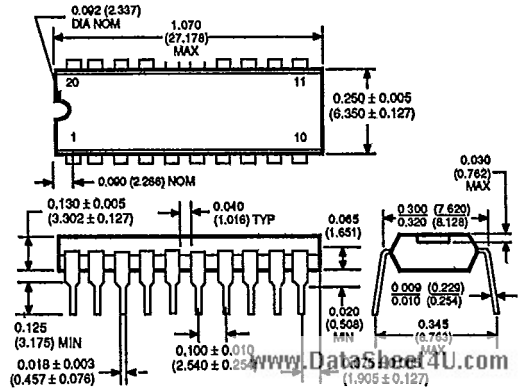
All Dimensions In Inches and (millimeters)

Package 9 14-Pin Plastic Dip



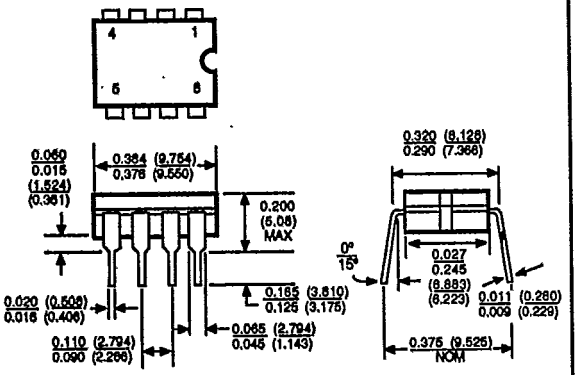
All Dimensions In Inches and (millimeters)

Package 12 20-Pin Plastic Dip



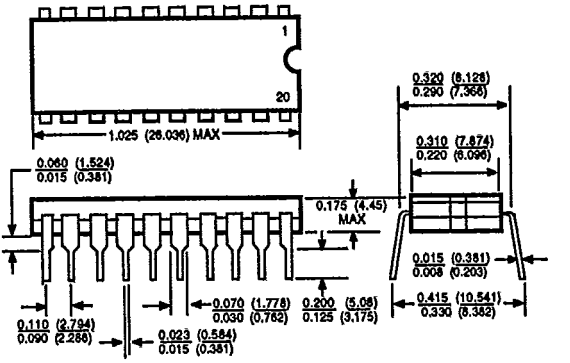
All Dimensions In Inches and (millimeters)

Package 13 8-Pin Ceramic Dip



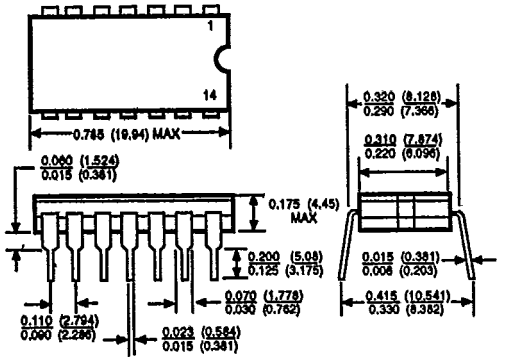
All Dimensions in Inches and (millimeters)

Package 16 20-Pin Ceramic Dip



All Dimensions in Inches and (millimeters)

Package 14 (TO-116) 14-Pin Ceramic Dip



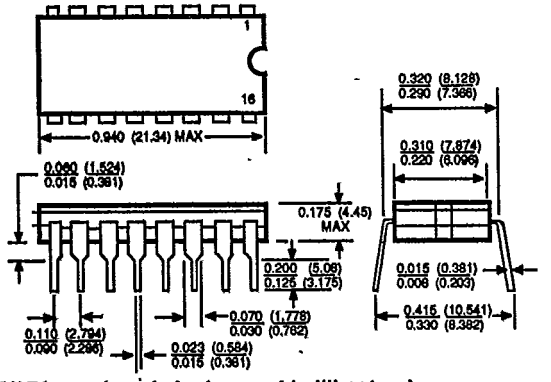
All Dimensions in Inches and (millimeters)

Package 17

NONE

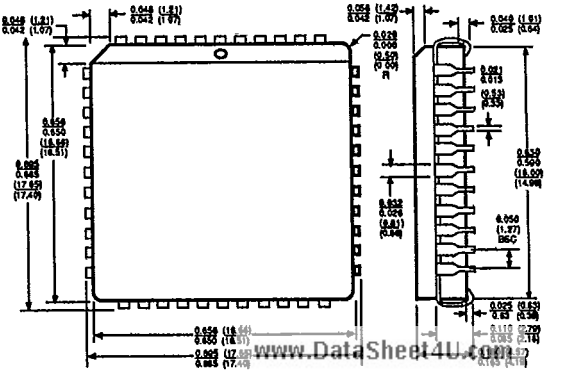
All Dimensions in Inches and (millimeters)

Package 15 16-Pin Ceramic Dip



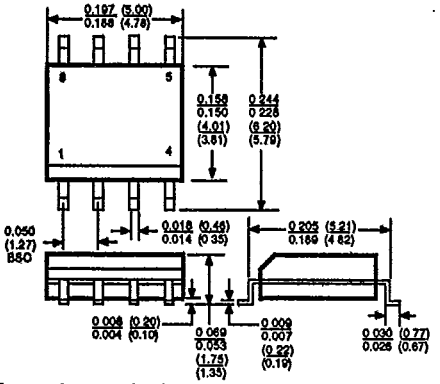
All Dimensions in Inches and (millimeters)

Package 18 PLCC-44



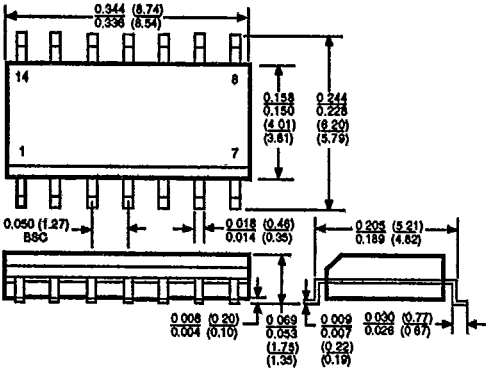
All Dimensions in Inches and (millimeters)

Package 19 (SO-8)



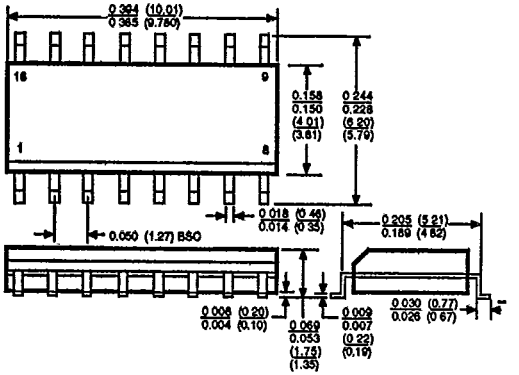
All Dimensions in Inches and (millimeters)

Package 20 (SO-14)



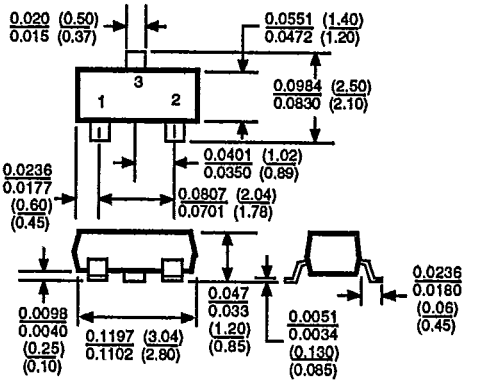
All Dimensions in Inches and (millimeters)

Package 21 (SO-16)



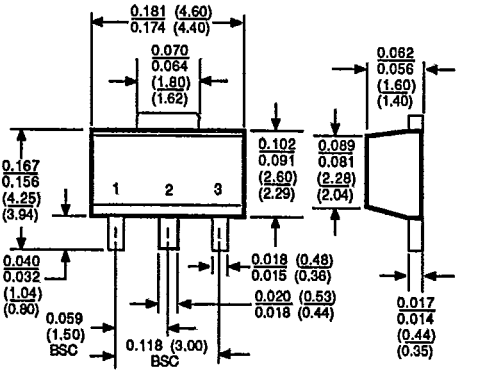
All Dimensions in Inches and (millimeters)

Package 22 (SOT-23) TO-236AA



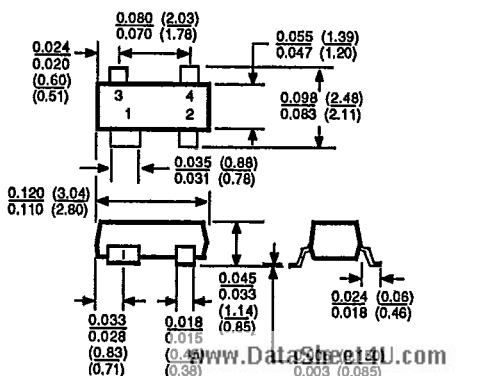
All Dimensions in Inches and (millimeters)

Package 23 (SOT-89) TO-243AA



All Dimensions in Inches and (millimeters)

Package 24 (SOT-143)



All Dimensions in Inches and (millimeters)