15A, 600V Stealth™ Diode

The ISL9R1560S3S is a Stealth™ diode optimized for low loss performance in high frequency hard switched applications. The Stealth™ family exhibits low reverse recovery current (I_{RRM}) and exceptionally soft recovery under typical operating conditions.

This device is intended for use as a free wheeling or boost diode in power supplies and other power switching applications. The low I_{RRM} and short t_a phase reduce loss in switching transistors. The soft recovery minimizes ringing, expanding the range of conditions under which the diode may be operated without the use of additional snubber circuitry. Consider using the Stealth™ diode with an SMPS IGBT to provide the most efficient and highest power density design at lower cost.

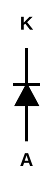
Formerly developmental type TA49410.

Ordering Information

PART NUMBER	PACKAGE	BRAND
ISL9R1560S3S	TO-263AB	R1560S3S

NOTE: When ordering, use the entire part number.

Symbol



Features

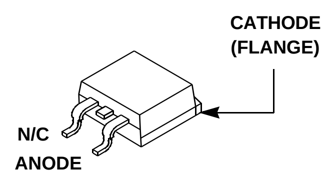
- Soft Recovery . . . . t_b / t_a > 1.2
- Fast Recovery . . . . t_{rr} < 30ns
- Operating Temperature . . . . 175^{o}C
- Reverse Voltage 600V
- Avalanche Energy Rated

Applications

- Switch Mode Power Supplies
- Hard Switched PFC Boost Diode
- UPS Free Wheeling Diode
- Motor Drive FWD
- SMPS FWD
- Snubber Diode

Packaging

JEDEC TO-263AB



Absolute Maximum Ratings T_C = 25^{o}C, Unless Otherwise Specified

SYMBOL	PARAMETER	ISL9R1560S3S	UNITS
V_{RRM}	Peak Repetitive Reverse Voltage	600	V
V_{RWM}	Working Peak Reverse Voltage	600	V
V_R	DC Blocking Voltage	600	V
$I_{F(AV)}$	Average Rectified Forward Current	15	A
I_{FRM}	Repetitive Peak Surge Current (20kHz Square Wave)	30	A
I_{FSM}	Nonrepetitive Peak Surge Current (Halfwave 1 Phase 60Hz)	200	A
P_D	Power Dissipation	150	W
E_{AVL}	Avalanche Energy (1A, 40mH)	20	mJ
T_J, T_{STG}	Operating and Storage Temperature	-55 to 175	^{o}C
 T_L T_{pkg}	Maximum Temperature for Soldering Leads at 0.063in (1.6mm) from Case for 10s Package Body for 10s, See Techbrief TB334	 300 260	 ^{o}C ^{o}C
THERMAL SPECIFICATIONS			
$R_{\theta JC}$	Thermal Resistance Junction to Case	1.0	^{o}C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	62	^{o}C/W

NOTES:

CAUTION: *Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.*

Electrical Specifications $T_C = 25^oC$, Unless Otherwise Specified

SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNITS
V_F	$I_F = 15A$	-	1.8	2.2	V
	$I_F = 15A$, $T_C = 125^oC$	-	1.65	2.0	V
I_R	$V_R = 600V$	-	-	100	µA
	$V_R = 600V$, $T_C = 125^oC$	-	-	1.0	mA
t_{rr}	$I_F = 1A$, $dI_F/dt = 100A/µs$, $V_R = 30V$	-	25	30	ns
	$I_F = 15A$, $dI_F/dt = 100A/µs$, $V_R = 30V$	-	35	40	ns
t_{rr}	$I_F = 15A$, $dI_F/dt = 200A/µs$, $V_R = 390V$, $T_C = 25^oC$	-	29.4	-	ns
I_{RRM}		-	3.5	-	A
Q_{RR}		-	57	-	nC
t_{rr}	$I_F = 15A$, $dI_F/dt = 200A/µs$, $V_R = 390V$, $T_C = 125^oC$	-	90	-	ns
S		-	2.0	-	
I_{RRM}		-	5.0	-	A
Q_{RR}		-	275	-	nC
t_{rr}	$I_F = 15A$, $dI_F/dt = 800A/µs$, $V_R = 390V$, $T_C = 125^oC$	-	52	-	ns
S		-	1.36	-	
I_{RRM}		-	13.5	-	A
Q_{RR}		-	390	-	nC
dI_M/dt		-	800	-	A/µs
C_J	$V_R = 10V$, $I_F = 0A$	-	62	-	pF

DEFINITIONS

V_F = Instantaneous forward voltage (pw = 300µs, D = 2%)
pw = pulse width.
D = Duty cycle
I_R = Instantaneous reverse current.
t_{rr} = Reverse recovery time ($t_a + t_b$).
S = Softness factor (t_b / t_a).
I_{RRM} = Maximum reverse recovery current.
Q_{RR} = Reverse recovery charge.
dI_M/dt = Maximum di/dt during t_b.
C_J = Junction Capacitance.

Typical Performance Curves

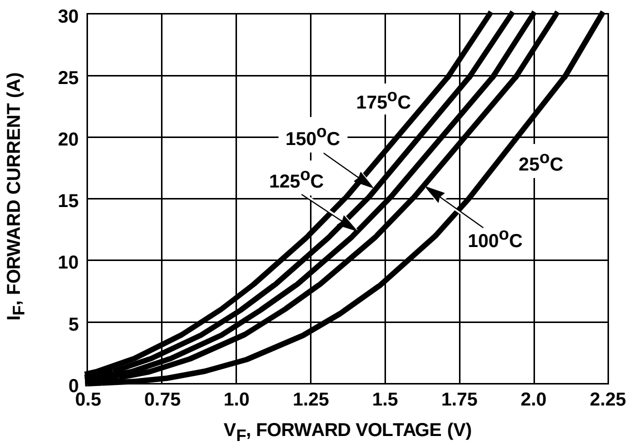


FIGURE 1. FORWARD CURRENT vs FORWARD VOLTAGE

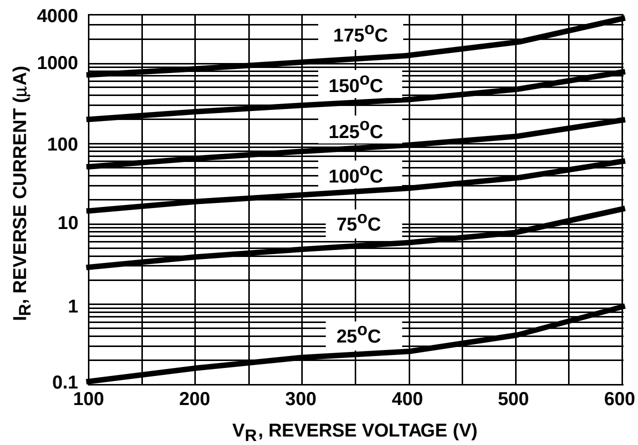


FIGURE 2. REVERSE CURRENT vs REVERSE VOLTAGE

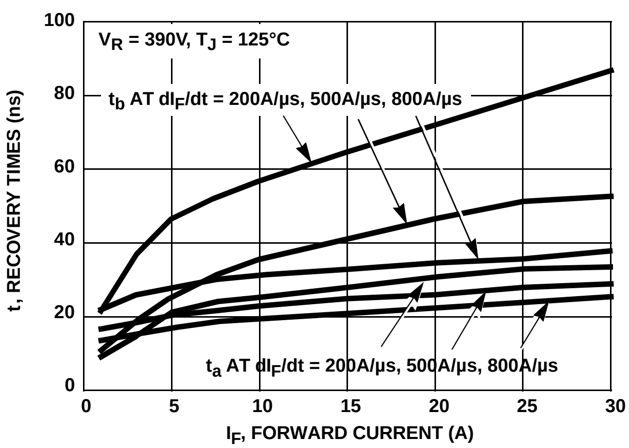


FIGURE 3. t_a AND t_b CURVES vs FORWARD CURRENT

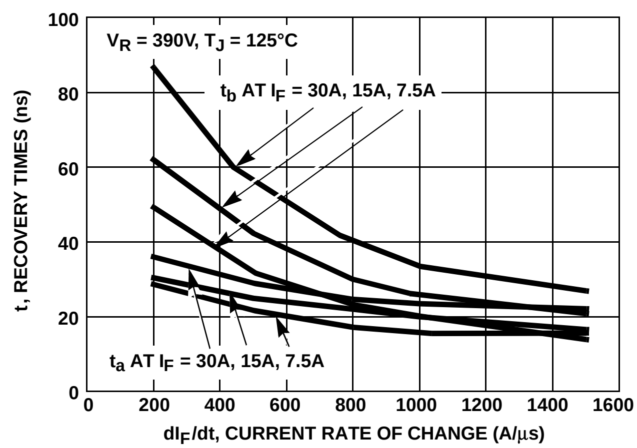


FIGURE 4. t_a AND t_b CURVES vs dI_F/dt

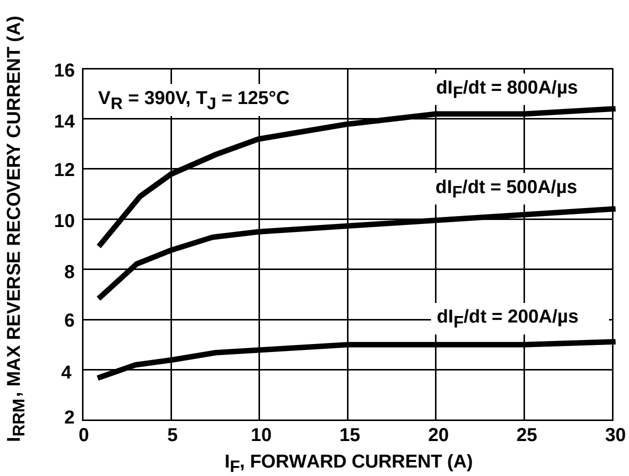


FIGURE 5. MAXIMUM REVERSE RECOVERY CURRENT vs FORWARD CURRENT

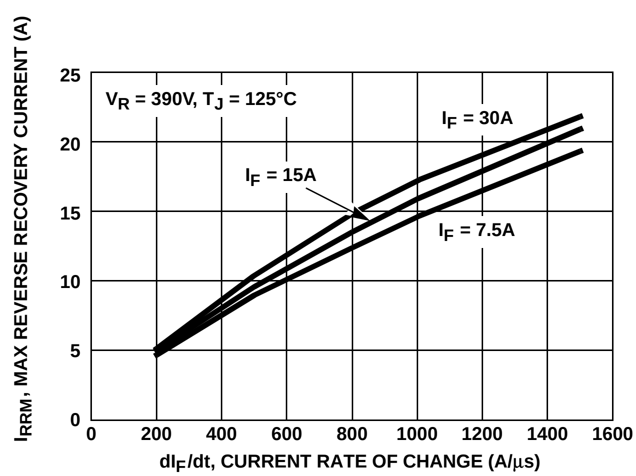


FIGURE 6. MAXIMUM REVERSE RECOVERY CURRENT vs dI_F/dt

Typical Performance Curves (Continued)

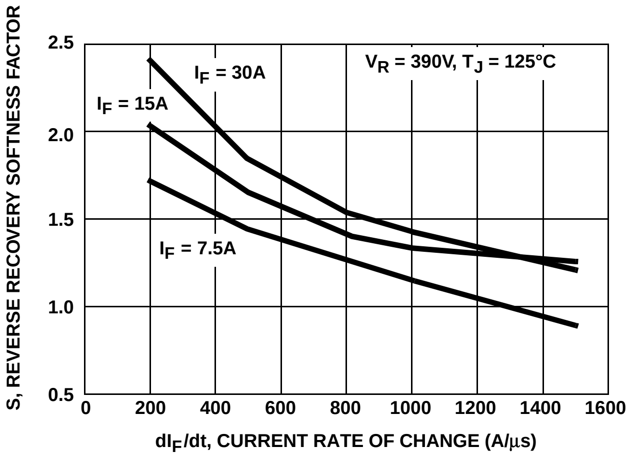


FIGURE 7. REVERSE RECOVERY SOFTNESS FACTOR vs dI_F/dt

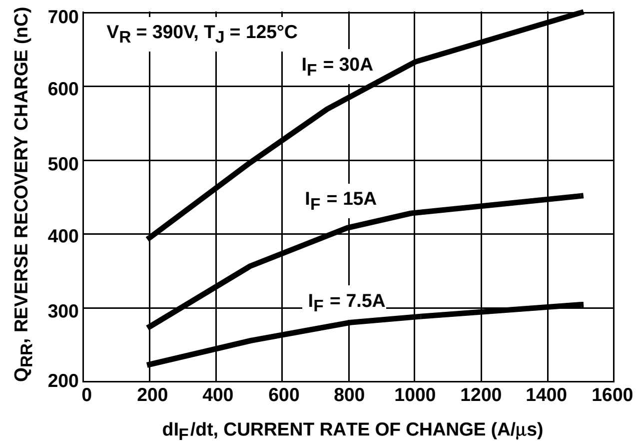


FIGURE 8. REVERSE RECOVERY CHARGE vs dI_F/dt

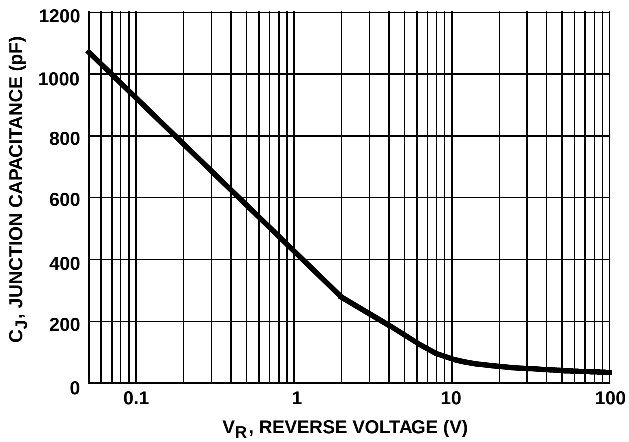


FIGURE 9. JUNCTION CAPACITANCE vs REVERSE VOLTAGE

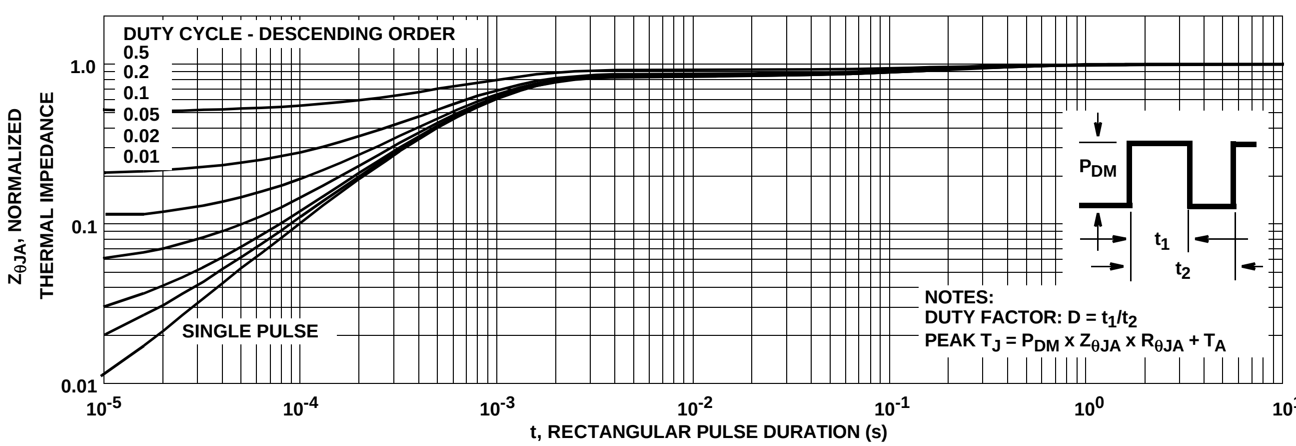


FIGURE 10. NORMALIZED MAXIMUM TRANSIENT THERMAL IMPEDANCE

Test Circuits and Waveforms

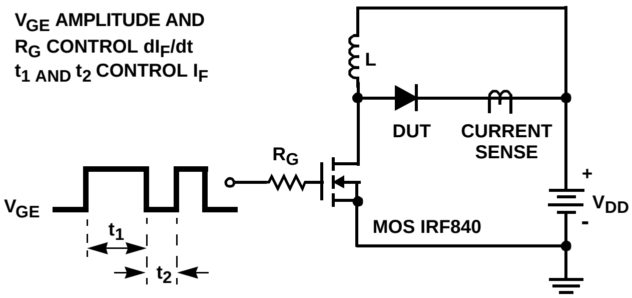


FIGURE 11. t_{rr} TEST CIRCUIT

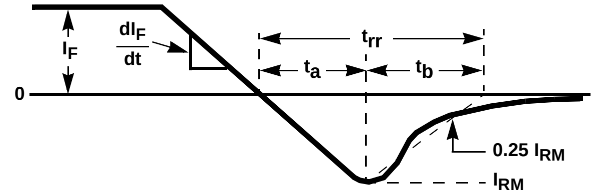


FIGURE 12. t_{rr} WAVEFORMS AND DEFINITIONS

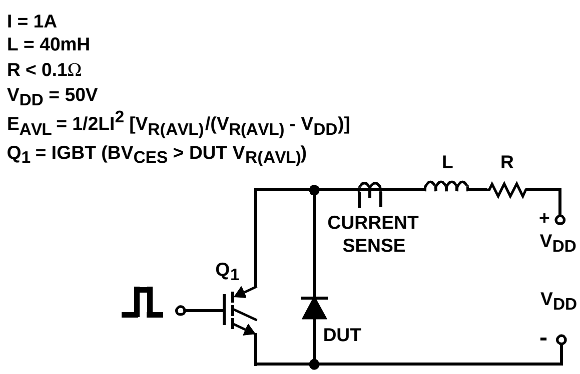


FIGURE 13. AVALANCHE ENERGY TEST CIRCUIT

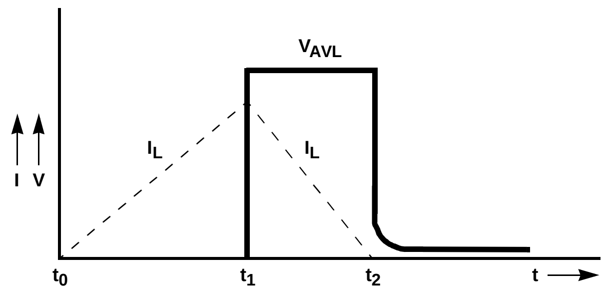
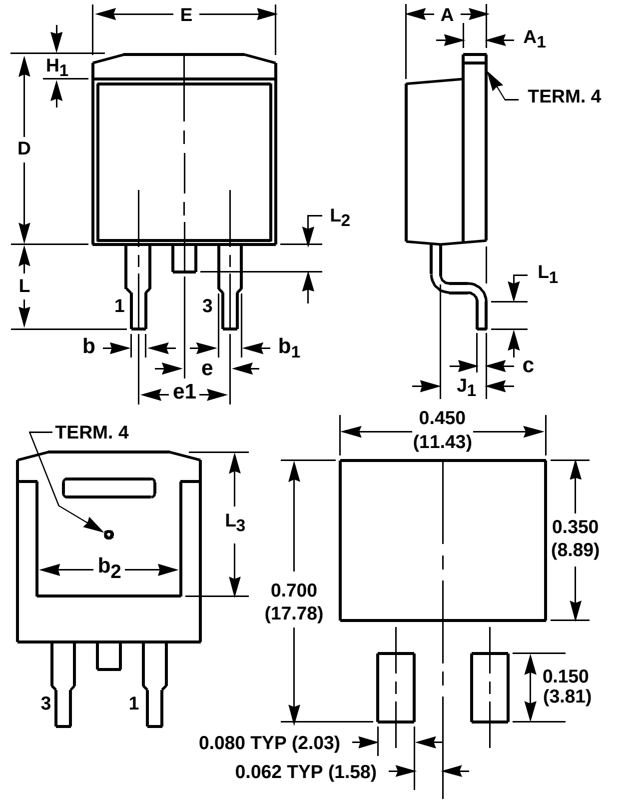


FIGURE 14. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

TO-263AB SURFACE MOUNT JEDEC TO-263AB PLASTIC PACKAGE



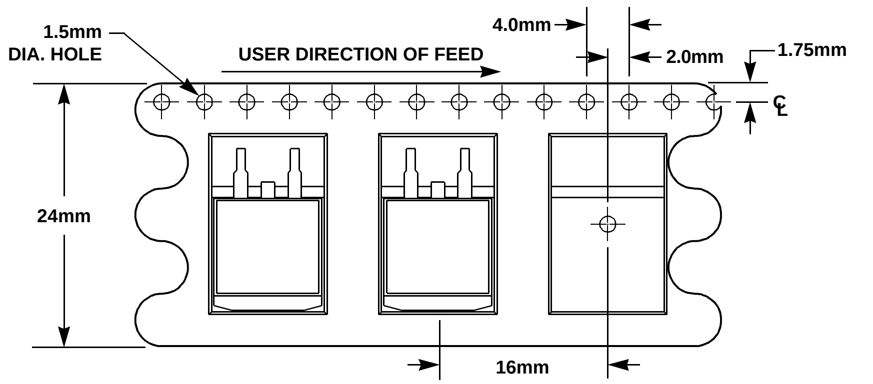
MINIMUM PAD SIZE RECOMMENDED FOR SURFACE-MOUNTED APPLICATIONS

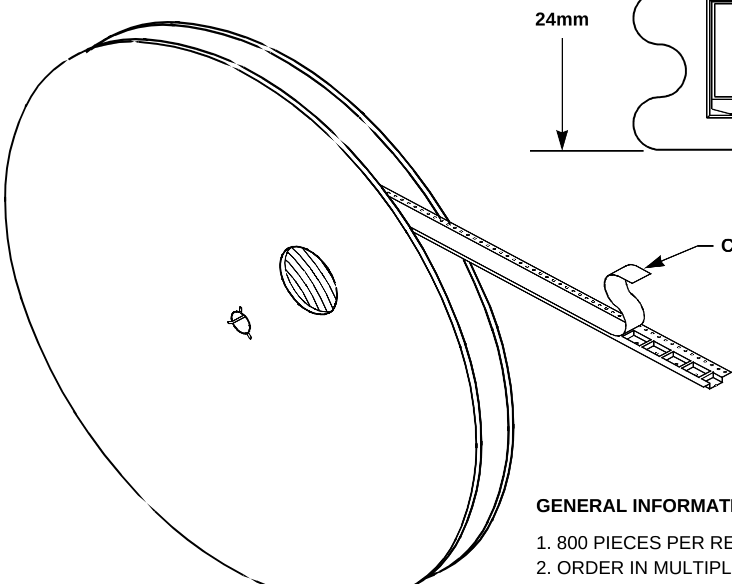
SYMBOL	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX	NOTES
A	0.170	0.180	4.32	4.57	-
A_1	0.048	0.052	1.22	1.32	4, 5
b	0.030	0.034	0.77	0.86	4, 5
b_1	0.045	0.055	1.15	1.39	4, 5
b_2	0.310	-	7.88	-	2
c	0.018	0.022	0.46	0.55	4, 5
D	0.405	0.425	10.29	10.79	-
E	0.395	0.405	10.04	10.28	-
e	0.100 TYP		2.54 TYP		7
e_1	0.200 BSC		5.08 BSC		7
H_1	0.045	0.055	1.15	1.39	-
J_1	0.095	0.105	2.42	2.66	-
L	0.175	0.195	4.45	4.95	-
L_1	0.090	0.110	2.29	2.79	4, 6
L_2	0.050	0.070	1.27	1.77	3
L_3	0.315	-	8.01	-	2

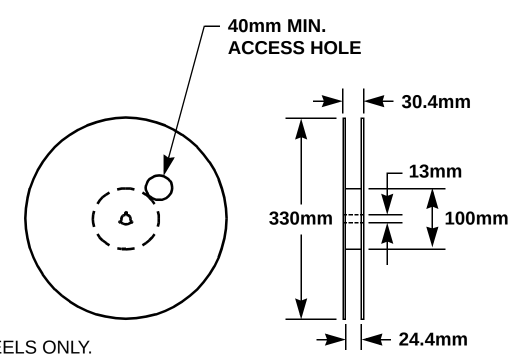
NOTES:
1. These dimensions are within allowable dimensions of Rev. C of JEDEC TO-263AB outline dated 2-92.
2. L_3 and b_2 dimensions established a minimum mounting surface for terminal 4.
3. Solder finish uncontrolled in this area.
4. Dimension (without solder).
5. Add typically 0.002 inches (0.05mm) for solder plating.
6. L_1 is the terminal length for soldering.
7. Position of lead to be measured 0.120 inches (3.05mm) from bottom of dimension D.
8. Controlling dimension: Inch.
9. Revision 11 dated 5-99.

TO-263AB

24mm TAPE AND REEL







GENERAL INFORMATION

1. 800 PIECES PER REEL.
2. ORDER IN MULTIPLES OF FULL REELS ONLY.
3. MEETS EIA-481 REVISION "A" SPECIFICATIONS.

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No Identification Needed	Full Production	This datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not In Production	This datasheet contains specifications on a product that has been discontinued by Fairchild semiconductor. The datasheet is printed for reference information only.