HARRIS SEMICONDUCTOR

RURD610CC, RURD615CC, RURD620CC, RURD610CCS, RURD615CCS, RURD620CCS

January 1996

6A, 100V - 200V Ultrafast Dual Diodes

Features

- **Ultrafast with Soft Recovery . . . . . <25ns**
- **Operating Temperature . . . . . +175^{o}C**
- **Reverse Voltage Up To 200V**
- **Avalanche Energy Rated**
- **Planar Construction**

Applications

- **Switching Power Supplies**
- **Power Switching Circuits**
- **General Purpose**

Description

RURD610CC, RURD615CC, RURD620CC, RURD610CCS, RURD615CCS and RURD620CCS are ultrafast dual diodes with soft recovery characteristics (t_{RR} < 25ns). They have low forward voltage drop and are silicon nitride passivated ion-implanted epitaxial planar construction.

These devices are intended for use as freewheeling/clamping diodes and rectifiers in a variety of switching power supplies and other power switching applications. Their low stored charge and ultrafast soft recovery minimize ringing and electrical noise in many power switching circuits reducing power loss in the switching transistors.

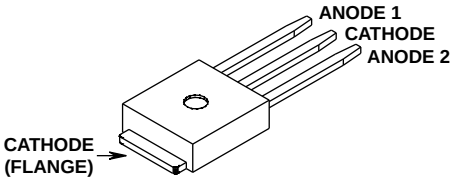
Ordering Information

PART NUMBER	PACKAGE	BRAND
RURD610CC	TO-251AA	UR610C
RURD615CC	TO-251AA	UR615C
RURD620CC	TO-251AA	UR620C
RURD610CCS	TO-252AA	UR610C
RURD615CCS	TO-252AA	UR615C
RURD620CCS	TO-252AA	UR620C

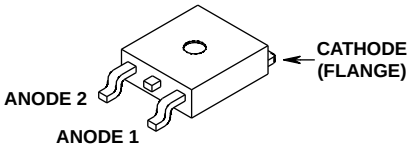
NOTE: When ordering, use the entire part number. Add the suffix, 9A, to obtain the TO-252 variant in tape and reel, i.e. RURD620CCS9A. Formerly developmental type TA49037.

Package

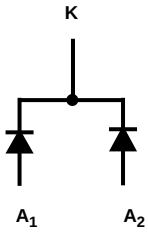
JEDEC TO-251AA



JEDEC TO 252AA



Symbol



Absolute Maximum Ratings (Per Leg) T_C = +25^{o}C, Unless Otherwise Specified

		RURD610CC RURD610CCS	RURD615CC RURD615CCS	RURD620CC RURD620CCS	UNITS
Peak Repetitive Reverse Voltage	V_{RRM}	100	150	200	V
Working Peak Reverse Voltage	V_{RWM}	100	150	200	V
DC Blocking Voltage	V_R	100	150	200	V
Average Rectified Forward Current (T_C = +160^{o}C)	$I_{F(AV)}$	6	6	6	A
Repetitive Peak Surge Current (Square Wave, 20kHz)	I_{FSM}	12	12	12	A
Nonrepetitive Peak Surge Current (Halfwave, 1 phase, 60Hz)	I_{FSM}	60	60	60	A
Maximum Power Dissipation	P_D	45	45	45	W
Avalanche Energy (See Figures 10 and 11)	E_{AVL}	10	10	10	mJ
Operating and Storage Temperature	T_{STG},T_J	-65 to +175	-65 to +175	-65 to +175	^{o}C

Spec Number **4075**

Electrical Specifications (Per Leg) $T_C = +25^oC$, Unless Otherwise Specified

SYMBOL	TEST CONDITION	RURD610CC RURD610CCS			RURD615CC RURD615CCS			RURD620CC RURD620CCS			UNITS
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	
V_F	$I_F = 6A, T_C = +25^oC$	-	-	1.0	-	-	1.0	-	-	1.0	V
V_F	$I_F = 6A, T_C = +150^oC$	-	-	0.83	-	-	0.83	-	-	0.83	V
I_R	$V_R = 100V, T_C = +25^oC$	-	-	100	-	-	-	-	-	-	µA
	$V_R = 150V, T_C = +25^oC$	-	-	-	-	-	100	-	-	-	µA
	$V_R = 200V, T_C = +25^oC$	-	-	-	-	-	-	-	-	100	µA
I_R	$V_R = 100V, T_C = +150^oC$	-	-	500	-	-	-	-	-	-	µA
	$V_R = 150V, T_C = +150^oC$	-	-	-	-	-	500	-	-	-	µA
	$V_R = 200V, T_C = +150^oC$	-	-	-	-	-	-	-	-	500	µA
t_{RR}	$I_F = 1A, dI_F/dt = 200A/µs$	-	-	25	-	-	25	-	-	25	ns
	$I_F = 6A, dI_F/dt = 200A/µs$	-	-	30	-	-	30	-	-	30	ns
t_A	$I_F = 6A, dI_F/dt = 200A/µs$	-	13	-	-	13	-	-	13	-	ns
t_B	$I_F = 6A, dI_F/dt = 200A/µs$	-	6.5	-	-	6.5	-	-	6.5	-	ns
Q_{RR}	$I_F = 6A, dI_F/dt = 200A/µs$	-	20	-	-	20	-	-	20	-	nC
C_J	$V_R = 10V, I_F = 0A$	-	30	-	-	30	-	-	30	-	pf
$R_{\theta JC}$		-	-	3.5	-	-	3.5	-	-	3.5	$^oC/W$

DEFINITIONS

V_F = Instantaneous forward voltage (pw = 300µs, D = 2%).

I_R = Instantaneous reverse current.

t_{RR} = Reverse recovery time (See Figure 2), summation of $t_A + t_B$.

t_A = Time to reach peak reverse current (See Figure 2).

t_B = Time from peak I_{RM} to projected zero crossing of I_{RM} based on a straight line from peak I_{RM} through 25% of I_{RM} (See Figure 2).

Q_{RR} = Reverse recovery charge.

C_J = Junction Capacitance.

$R_{\theta JC}$ = Thermal resistance junction to case.

E_{AVL} = Controlled Avalanche Energy (See Figures 10 and 11).

pw = pulse width.

D = duty cycle.

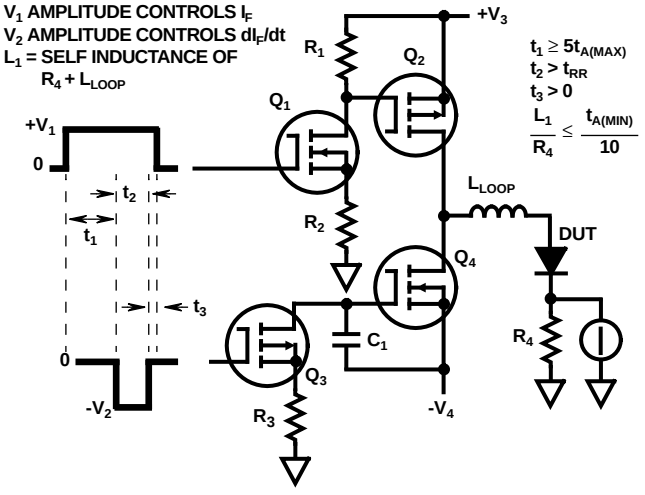


FIGURE 1. t_{RR} TEST CIRCUIT

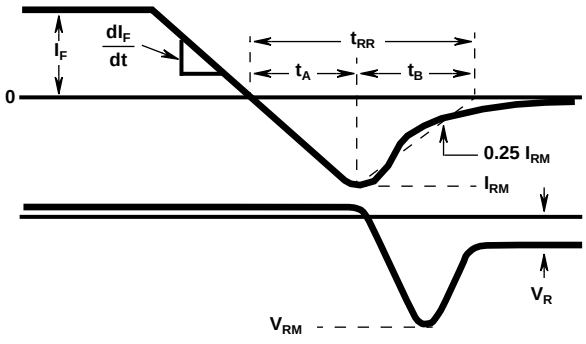


FIGURE 2. t_{RR} WAVEFORMS AND DEFINITIONS

Typical Performance Curves

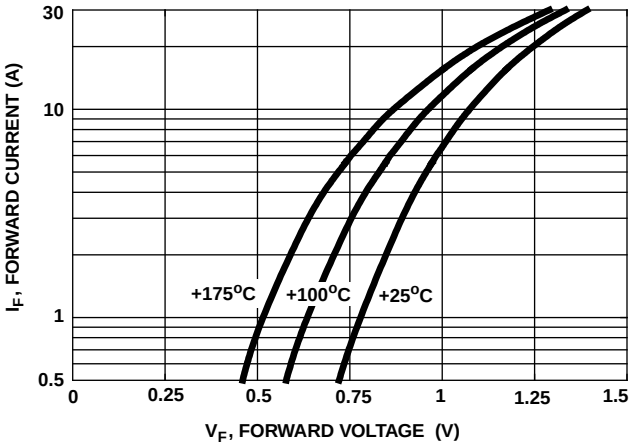


FIGURE 3. TYPICAL FORWARD CURRENT vs FORWARD VOLTAGE DROP

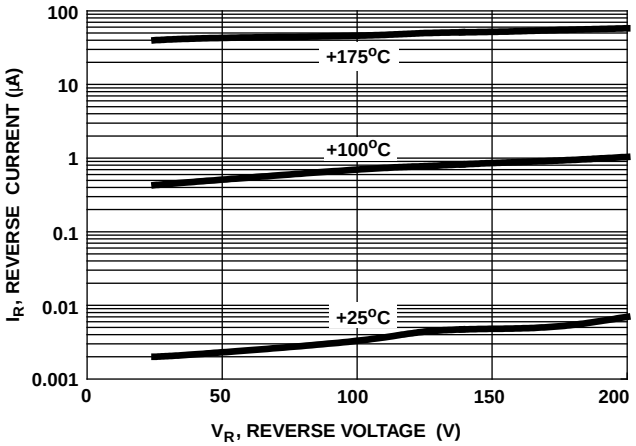


FIGURE 4. TYPICAL REVERSE CURRENT vs REVERSE VOLTAGE

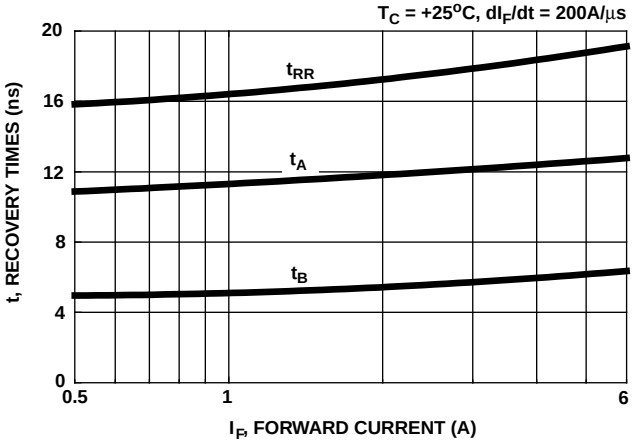


FIGURE 5. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT 25°C

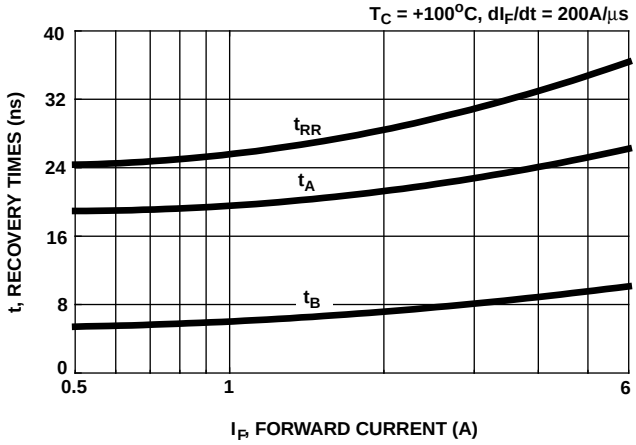


FIGURE 6. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT 100°C

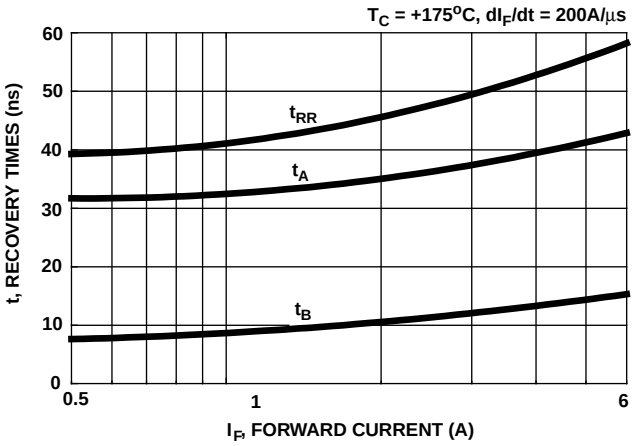


FIGURE 7. TYPICAL t_{RR}, t_A AND t_B CURVES vs FORWARD CURRENT AT 175°C

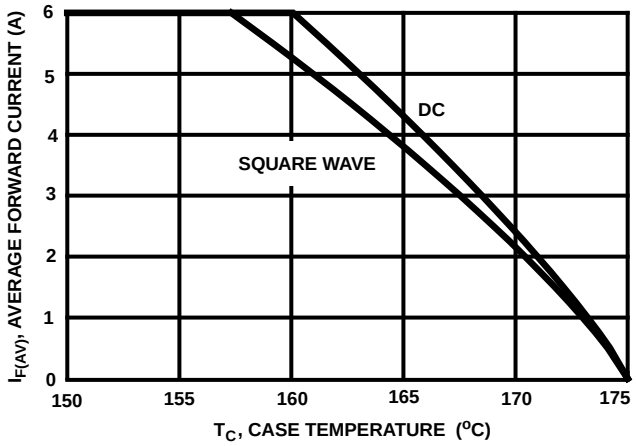


FIGURE 8. CURRENT DERATING CURVE FOR ALL TYPES

Typical Performance Curves (Continued)

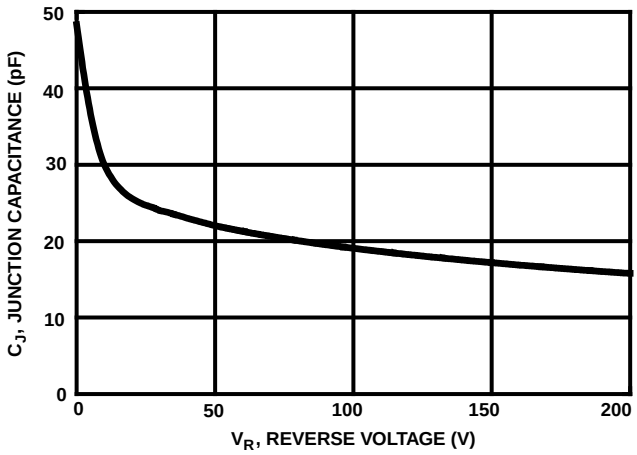


FIGURE 9. TYPICAL JUNCTION CAPACITANCE vs REVERSE VOLTAGE

Test Circuit and Waveform

L = 40mH
R < 0.1Ω
$E_{AVL} = 1/2LI^2 [V_{AVL}/(V_{AVL} - V_{DD})]$
Q_1 AND Q_2 ARE 1000V MOSFETs

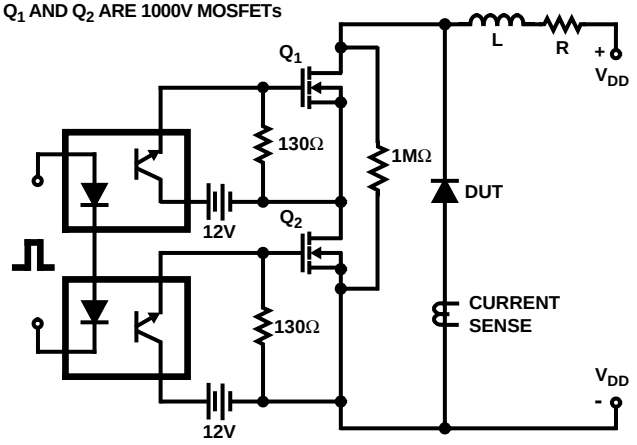


FIGURE 10. AVALANCHE ENERGY TEST CIRCUIT

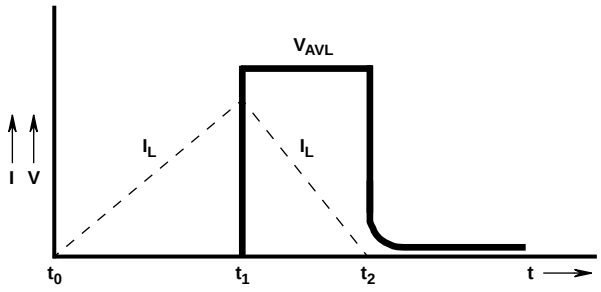
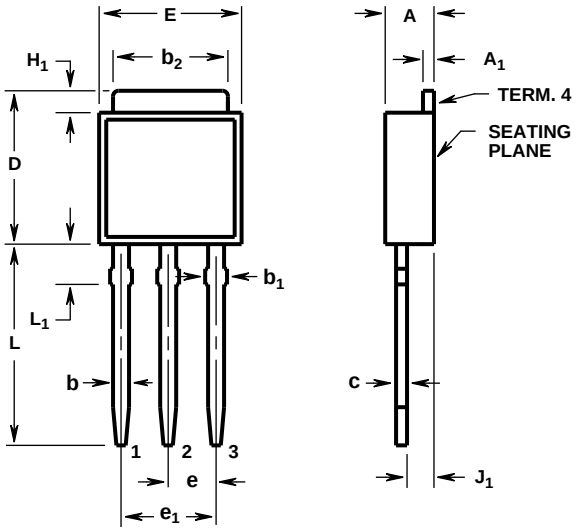


FIGURE 11. AVALANCHE CURRENT AND VOLTAGE WAVEFORMS

Plastic Packages



TO-251AA

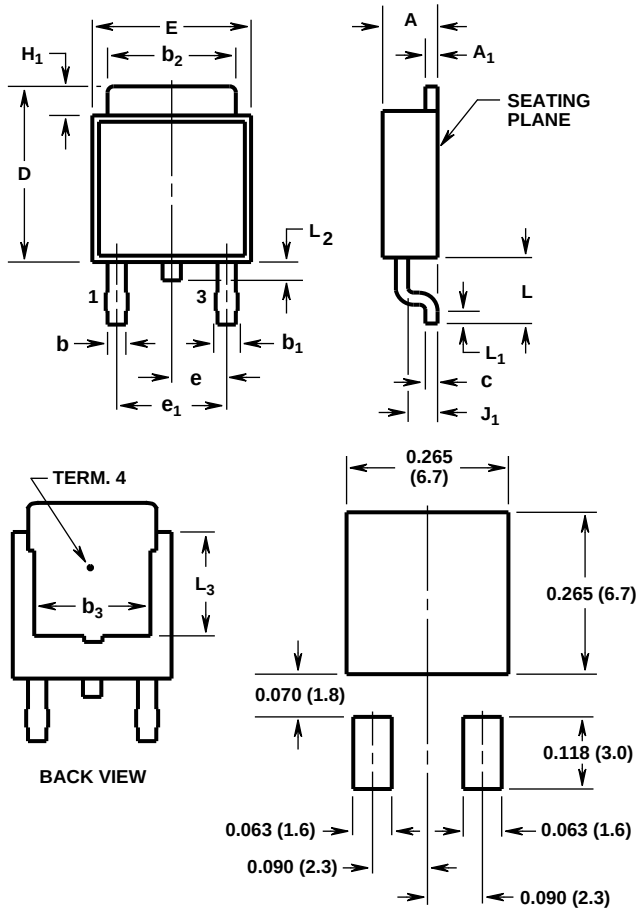
3 LEAD JEDEC TO-251AA PLASTIC PACKAGE

SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.086	0.094	2.19	2.38	-
A_1	0.018	0.022	0.46	0.55	3, 4
b	0.028	0.032	0.72	0.81	3, 4
b_1	0.033	0.040	0.84	1.01	3
b_2	0.205	0.215	5.21	5.46	3, 4
c	0.018	0.022	0.46	0.55	3, 4
D	0.270	0.290	6.86	7.36	-
E	0.250	0.265	6.35	6.73	-
e	0.090 TYP		2.28 TYP		5
e_1	0.180 BSC		4.57 BSC		5
H_1	0.035	0.045	0.89	1.14	-
J_1	0.040	0.045	1.02	1.14	6
L	0.355	0.375	9.02	9.52	-
L_1	0.075	0.090	1.91	2.28	2

NOTES:

1. These dimensions are within allowable dimensions of Rev. C of JEDEC TO-251AA outline dated 9-88.
2. Solder finish uncontrolled in this area.
3. Dimension (without solder).
4. Add typically 0.002 inches (0.05mm) for solder plating.
5. Position of lead to be measured 0.250 inches (6.35mm) from bottom of dimension D.
6. Position of lead to be measured 0.100 inches (2.54mm) from bottom of dimension D.
7. Controlling dimension: Inch.
8. Revision 2 dated 10-95.

Plastic Packages



MINIMUM PAD SIZE RECOMMENDED FOR SURFACE-MOUNTED APPLICATIONS

LEAD NO. 1 - ANODE NO. 1

LEAD NO. 3 - ANODE NO. 2

TERM 4 - CATHODE

TO-252AA

SURFACE MOUNT JEDEC TO-252AA PLASTIC PACKAGE

SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.086	0.094	2.19	2.38	-
A_1	0.018	0.022	0.46	0.55	4, 5
b	0.028	0.032	0.72	0.81	4, 5
b_1	0.033	0.040	0.84	1.01	4
b_2	0.205	0.215	5.21	5.46	4, 5
b_3	0.190	-	4.83	-	2
c	0.018	0.022	0.46	0.55	4, 5
D	0.270	0.290	6.86	7.36	-
E	0.250	0.265	6.35	6.73	-
e	0.090 TYP		2.28 TYP		7
e_1	0.180 BSC		4.57 BSC		7
H_1	0.035	0.045	0.89	1.14	-
J_1	0.040	0.045	1.02	1.14	-
L	0.100	0.115	2.54	2.92	-
L_1	0.020	-	0.51	-	4, 6
L_2	0.025	0.040	0.64	1.01	3
L_3	0.170	-	4.32	-	2

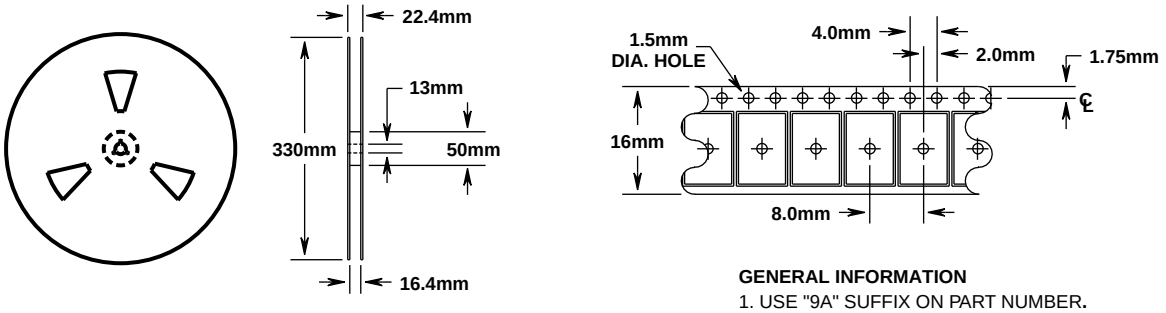
NOTES:

1. These dimensions are within allowable dimensions of Rev. B of JEDEC TO-252AA outline dated 9-88.
2. L_3 and b_3 dimensions establish 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 0.090 inches (2.28mm) from bottom of dimension D.
8. Controlling dimension: Inch.
9. Revision 5 dated 10-95.

Packaging (Continued)

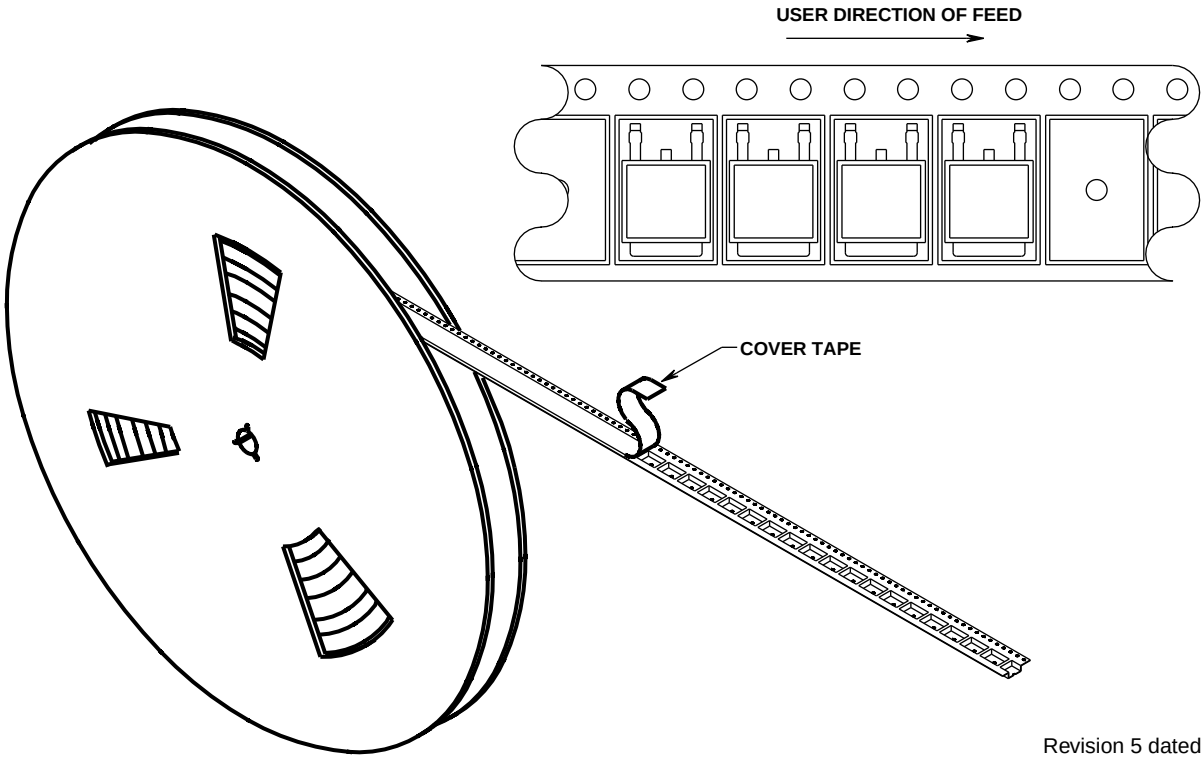
TO-252AA

16mm TAPE AND REEL



GENERAL INFORMATION

1. USE "9A" SUFFIX ON PART NUMBER.
2. 2500 PIECES PER REEL.
3. ORDER IN MULTIPLES OF FULL REELS ONLY.
4. MEETS EIA-481 REVISION "A" SPECIFICATIONS.



Revision 5 dated 10-95

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