



Application Note

AP60X Evaluation Board Modifications for TVS Protection

Product Information

The AP60X Evaluation Board has been modified with Transient Voltage Suppression protection on the DC Supply lines. TVS diodes have been added to the Vpd, Vbias and Vcc lines. Table 1 contains mfg part numbers. Figure 1 is a AP60X schematic update. Figure 2 is the assembly drawing and Fig. 3 is a photo of a modified board. The SOT-23 TVS used on the Vpd and Vbias lines contains two TVS diodes in a single package.

TVS components for WJ power amplifier products that operate at +12V (AP56X) and +5V (AH21X, AH31X) are also included in Table 1, although they are not used for the +28V AP60X series.

Additional protection is provided by adding a 10K resistor from the Vpd line to ground so that the base of the bias transistor internal to the AP60X device has a DC path to ground.

Table 1. TVS Diodes for Power Amplifier Evaluation Boards

Bias Line	Voltage	WJ P/N	Manufacturer	Manufacturer P/N	Description
Vpd,	+5V	TBD	Littelfuse, Inc.	SP0502BAHTG	TVS DIODE ARRAY 2 CH, 5V SOT23, LEAD-FREE/GREEN
Vbias			On Semiconductor	SM05T1G	
			ST Microelectronics	ESDA6V1L	
			Microsemi	SM05E3	
Vcc	+28V	TBD	Littelfuse, Inc.	SMAJ33A	DIODE TVS 33V 400W UNI 5% SMA
			Diodes Inc.	SMAJ33CA-13	
			On Semiconductor	1SMA33AT3	
			ST Microelectronics	SMAJ33A	
			Vishay/General Semiconductor	SMAJ33A	
Vcc	+12V	TBD	Littelfuse, Inc.	SMAJ13A	DIODE TVS 13V 400W UNI 5% SMA
			On Semiconductor	1SMA13AT3	
			ST Microelectronics	SMAJ13A	
			Diodes Inc.	SMAJ13CA-13	
			Micro Commercial Co	SMAJ13A-TP	
Vcc	+5V	TBD	Littelfuse, Inc.	SP0502BAHTG	TVS DIODE ARRAY 2 CH, 5V SOT23, LEAD-FREE/GREEN
			On Semiconductor	SM05T1G	
			ST Microelectronics	ESDA6V1L	
			Microsemi	SM05E3	



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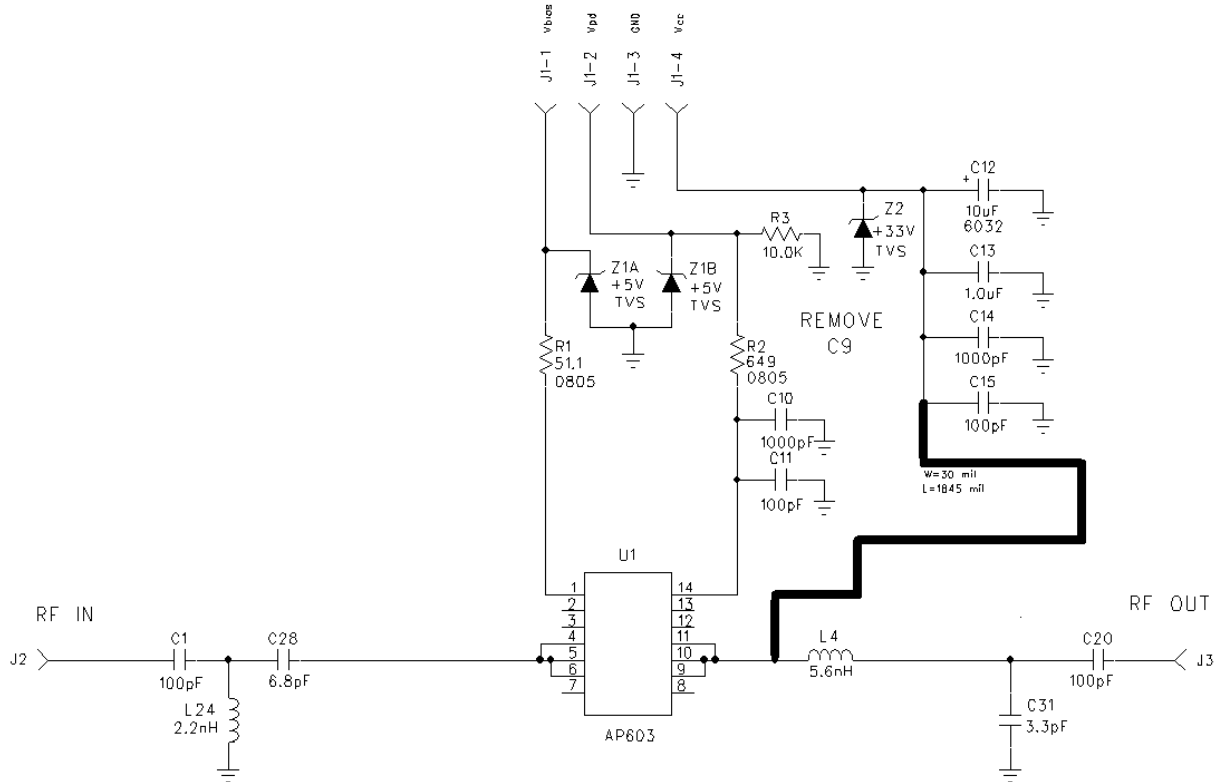


Fig 1. Schematic modifications for adding TVS protection to AP60X Evaluation Boards. Z1A and Z1B are +5V TVS Diodes are added at Vpd and Vbias. R3 is a 10KΩ added from Vpd to ground. Z2 is a +33V TVS added from Vcc to ground

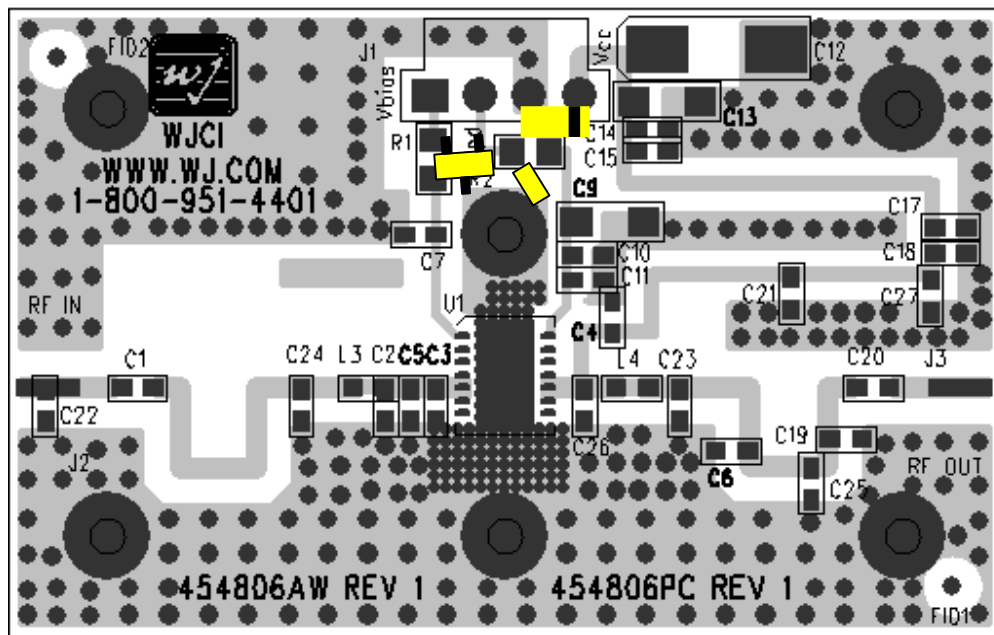


Fig 2. Assembly modifications for TVS protection. Remove C9 and place SOT-23 5V TVS diode. Add 10K to ground at R2. Place SOT-23 5V TVS diode from R1 to ground. Place SMAJ33V TVS diode at J1 pins 1 to 2.



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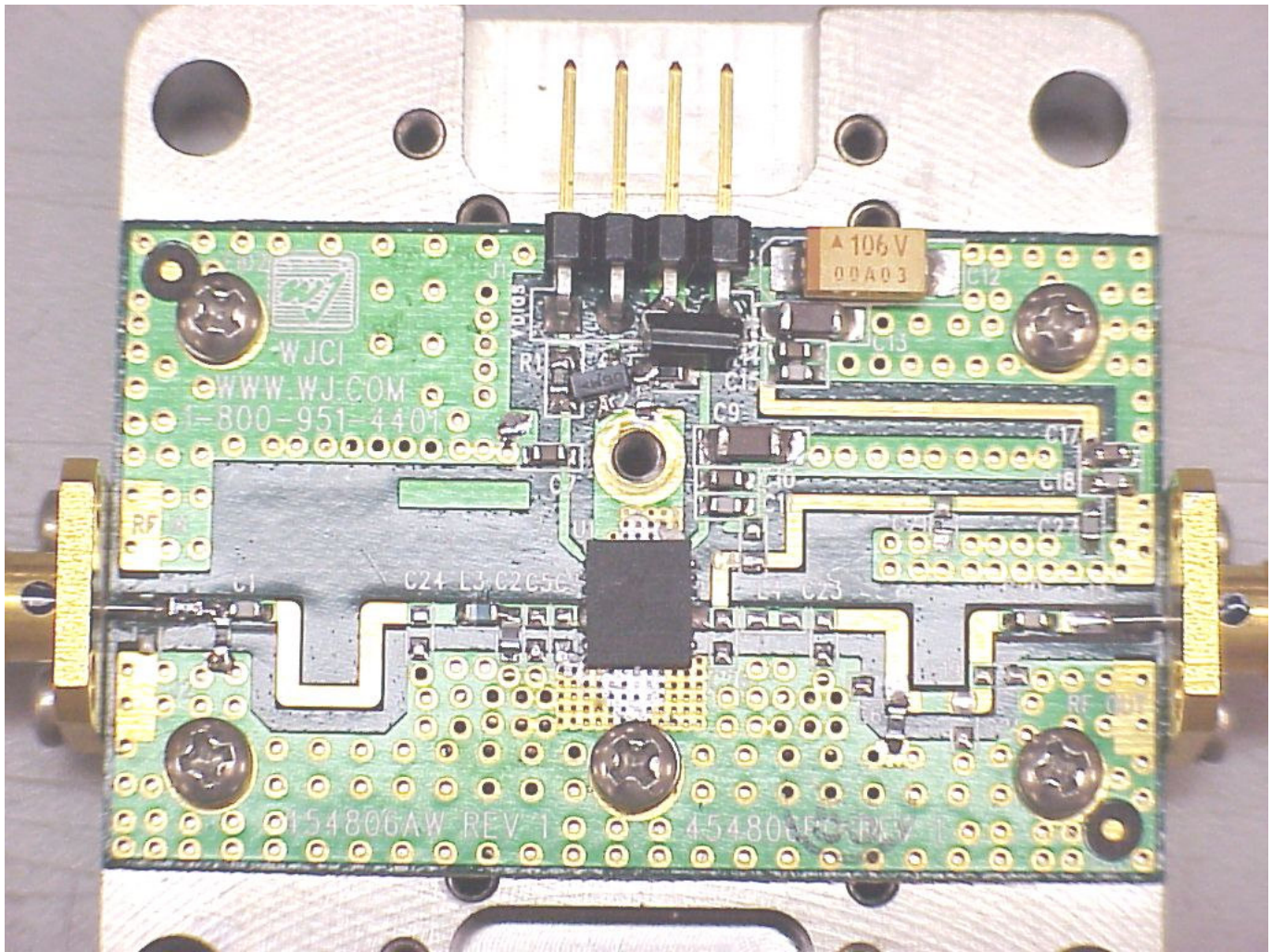


Fig 3. Photo of a AP60X evaluation board modified for TVS protection.