ESD Protection for IoT FEM with TVS Diode

Application Notes

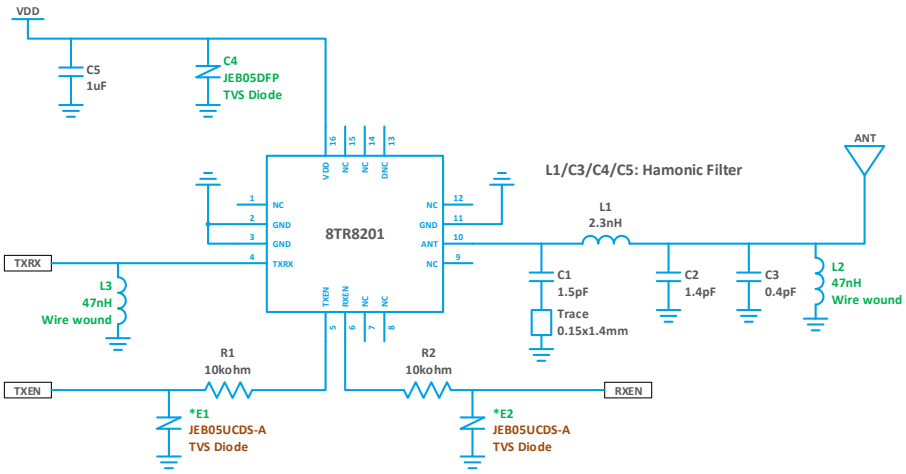
This application note explains how additional devices circuit delivers protection levels of ±4KV ESD HBM(Human Body Model). It will help in the long-term reliability of the final product.
For more detailed product specifications of the 8TR82xx, please check the datasheet.

Additional devices

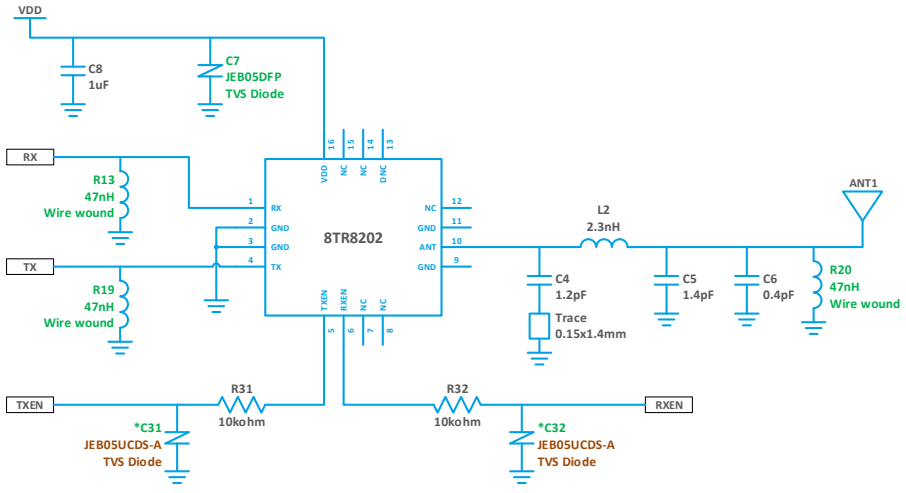
The protection devices added in the circuit are:
- RF Port(ANT, TXRX): 47nH Wire wound Inductor (Murata)
- VDD Line: JEB05DFP Bi-directional TVS Diode for ESD Protection (JIEJIE MICROELECTRONICS CO. , Ltd)
- Control Line(TXEN, RXEN): JEB05UCDS-A Bi-directional TVS Diode for ESD Protection (JIEJIE MICROELECTRONICS CO. , Ltd)

The level of protection provided has little effect due to part placement and orientation. Depending on the user's needs, it can be placed near the connector port or any device that needs protection.

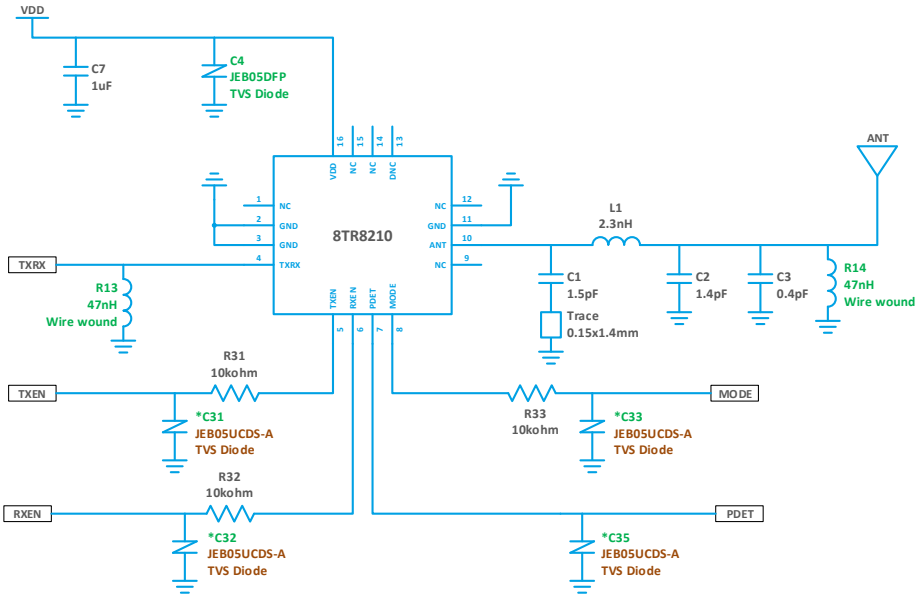
Application Schematic - 8TR8201



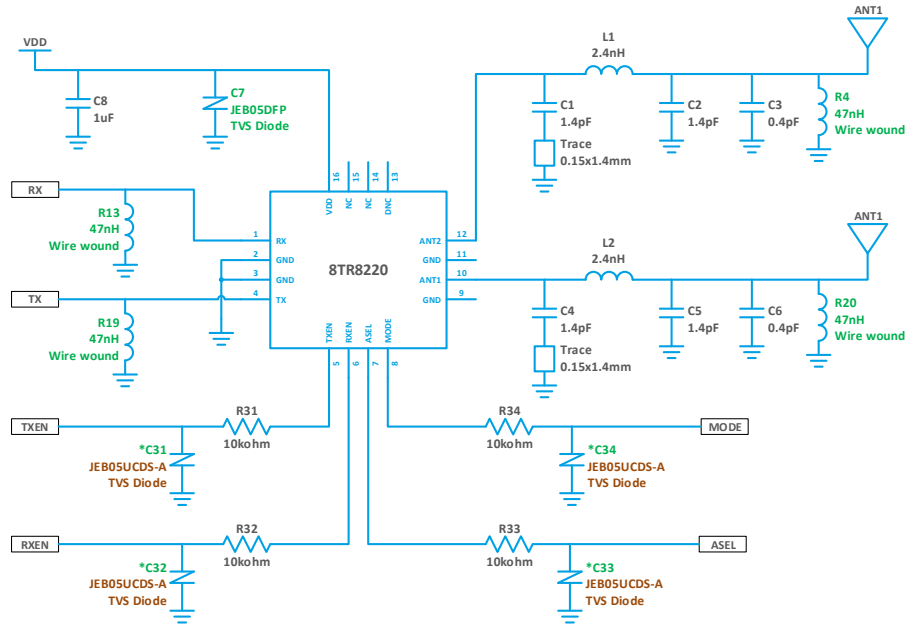
Application Schematic - 8TR8202



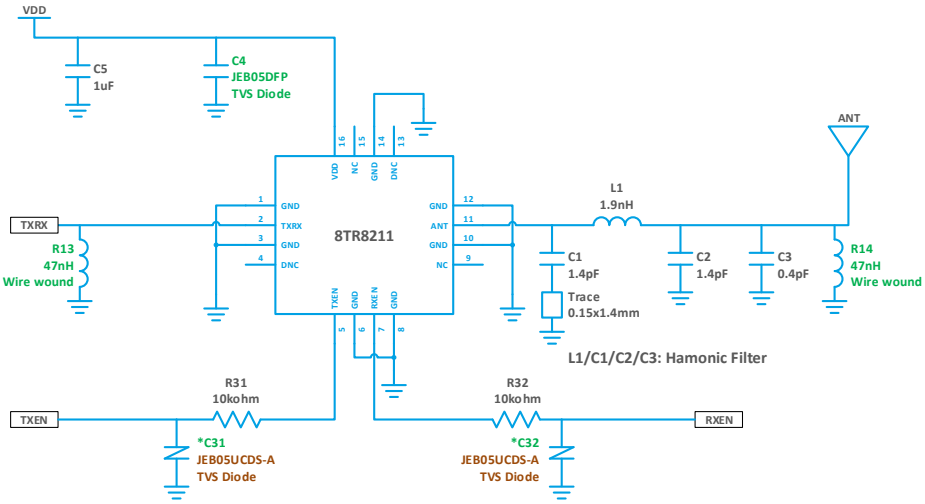
Application Schematic - 8TR8210



Application Schematic - 8TR8220



Application Schematic - 8TR8211 & 8TR8211C



Results & Recommendation

The additional device circuit was tested normally on the ±4KV ESD HBM(Human Body Model), after which it was confirmed that the parts continued to operate without any problems.

For long-term reliability of the final product, it is recommended to use the mentioned device (or the same specification). It will be able to achieve the required effect with minimal space.

*TVS Diode Electrical characteristics

Part No.	Reverse working voltage V_{RWM}	Reverse breakdown voltage V_{BR} I_T=1mA	Reverse leakage current I_R V_{RWM}=5V	Peak pulse current I_{PP} t_p=8/20μs	Clamping voltage		Junction capacitance C_J V_{RWM}=0V, f=1MHz
					I_{PP}=1A, t_p=8/20μs	I_{PP}=4.5A, t_p=8/20μs	
	[V]	[V]	[uA]	[A]	[V]	[V]	[pF]
JEB05DFP	Max. 5.0	Min. 5.5	Max. 1	Max. 35	Typ. 6.5 / Max. 9	Typ. 10.5 / Max. 14	Max. 80
JEB05UCDS-A	Max. 5.0	6 ~ 10	Max. 1	Max. 4.5	Typ. 12 / Max. 15	Typ. 20 / Max. 23	Typ. 0.4 / Max. 0.6