PROTEK DEVICES

EM1402

3 EMI FILTER/ 2 TVS ARRAY

10 BUMP FLIP CHIP

APPLICATIONS

✔ Cellular Phones
✔ Notebooks
✔ Personal Digital Assistant (PDA)
✔ Ground Positioning System (GPS)
✔ SIM Cards

IEC COMPATIBILITY (EN61000-4)

✔ 61000-4-2 (ESD): Air - 15kV, Contact - 8kV
✔ 61000-4-4 (EFT): 40A - 5/50ns

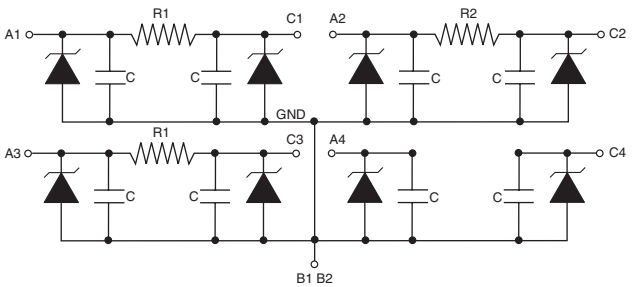
FEATURES

✔ ESD Protection > 25 kilovolts
✔ Bidirectional EMI Filtering/TVS Low Pass Filters
✔ Low Insertion Loss: -3db Roll-Off @ 77/85 MHz
✔ Protects Up to Five(5) Data Lines
✔ RoHS Compliant

MECHANICAL CHARACTERISTICS

✔ 10 Bump Flip Chip Package
✔ Weight 0.73 milligrams (Approximate)
✔ Available in Lead-Free Plating
✔ Solder Reflow Temperature:
Lead-Free - Sn/Ag/Cu, 96/3.5/0.5: 260-270°C
✔ Consult Factory for Leaded Device Availability
✔ Flammability Rating UL 94V-0
✔ 8mm Tape and Reel Per EIA Standard 481

PIN CONFIGURATION



R_1 = 100 Ohms
R_2 = 47 Ohms

DEVICE CHARACTERISTICS

MAXIMUM RATINGS @ 25°C Unless Otherwise Specified			
PARAMETER	**SYMBOL**	**VALUE**	**UNITS**
Operating Temperature	T_A	-40 to 85	°C
Storage Temperature	T_{STG}	-55 to 150	°C
DC Power Per Resistor	P	100	mW
Typical Resistance @ ± 20%	R_1	100	OHMS
Typical Resistance @ ± 20%	R_2	47	OHMS

ELECTRICAL CHARACTERISTICS PER LINE @ 25°C Unless Otherwise Specified							
PART NUMBER	RATED STAND-OFF VOLTAGE V_{WM} VOLTS	MINIMUM BREAKDOWN VOLTAGE @ 1mA $V_{(BR)}$ VOLTS	MAXIMUM LEAKAGE CURRENT @3V I_D µA	TYPICAL FORWARD VOLTAGE @ 10mA V_F VOLTS	MINIMUM ATTENUATION @ 800-3000 MHz dB	CUT-OFF FREQUENCY (50 Ohms I/O) ZERO BIAS fc MHz	TYPICAL CAPACITANCE PER LINE (See Note 1) @2.5V, 1 MHz C pF
EM1402	5.0	6.0	0.1	0.8	30	77/85	40

Note 1: ±20% tolerance.

GRAPHS

FIGURE 1
RESISTANCE VS TEMPERATURE
(Normalized to Resistance at 25°C)

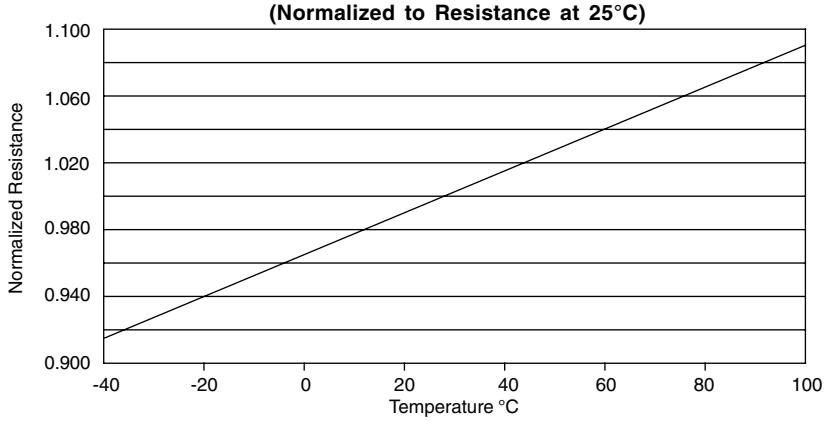
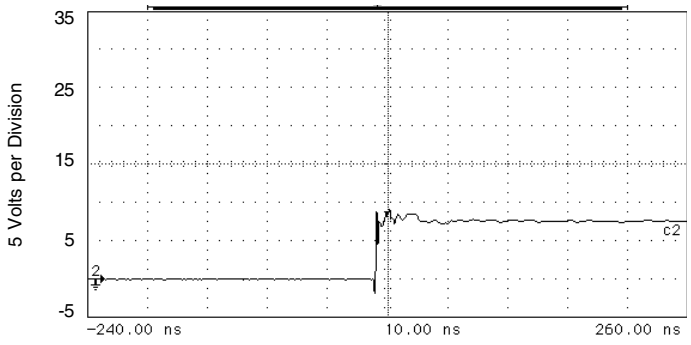


FIGURE 2
OVERSHOOT & CLAMPING VOLTAGE



ESD Test Pulse: +15 kilovolt, 1/30ns (waveform)

APPLICATION NOTE

The EM1402 provides a bidirectional filter and protector for all the signals and the power line on the SIM (subscriber indenty module) card connector. SIM cards are found in all GSM cellular phones and in some other handheld devices or card readers. The ESD diodes protect the controller against possible ESD strikes that may occur when the connector pins are exposed during direct contact or during insertion of the SIM card into the card slot. The EMI filter suppresses all high-frequency noise, preventing the unwanted EMI signals from both entering and exiting the main board. The signals that interface with the SIM card are the Reset, the Clock and the bidirectional data I/O as shown in Figure 1.

For best filter and ESD performance, both ground bumps (B1, B2) of the EM1402 should be directly connected to the ground plane. A small capacitor of about 1µF is required next to the V_{CC} pin of the SIM connector in order to improve stability of the SIM card supply rail.

CIRCUIT BOARD LAYOUT RECOMMENDATIONS

Circuit board layout is critical for Electromagnetic Compatibility (EMC) protection. The following guidelines are recommended:

- ✔ The protection device should be placed near the input terminals or connectors, the device will divert the transient current immediately before it can be coupled into the nearby traces.
- ✔ The path length between the TVS device and the protected line should be minimized.
- ✔ All conductive loops including power and ground loops should be minimized.
- ✔ The transient current return path to ground should be kept as short as possible to reduce parasitic inductance.
- ✔ Ground planes should be used whenever possible. For multilayer PCBs, use ground vias.

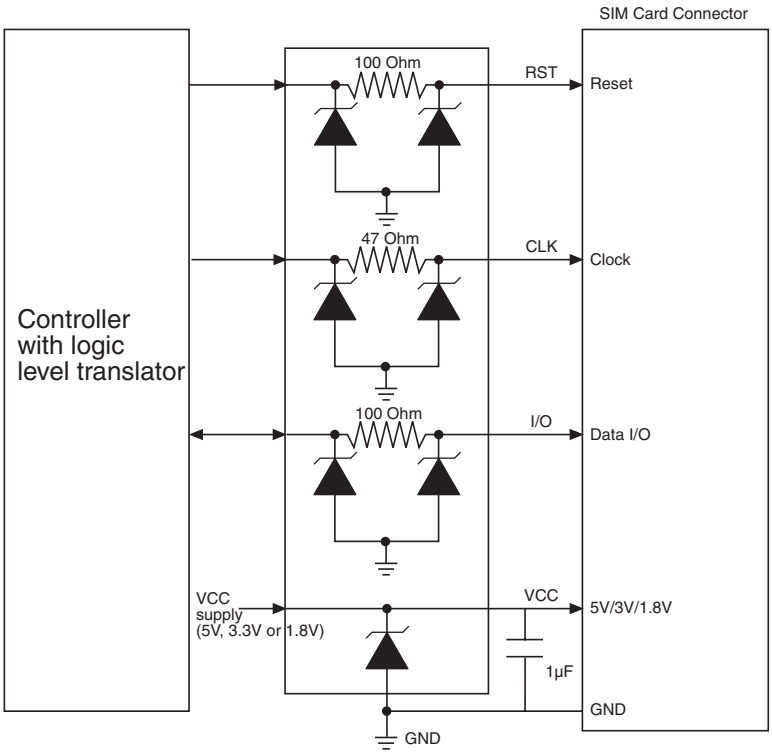


Figure 1. Typical Application for SIM Card Interface

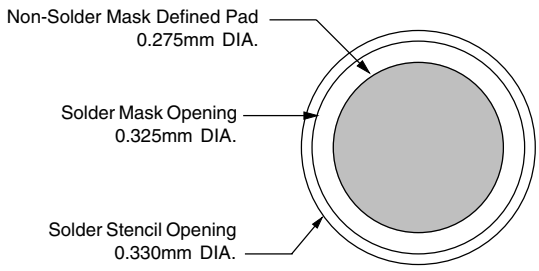
APPLICATION INFORMATION

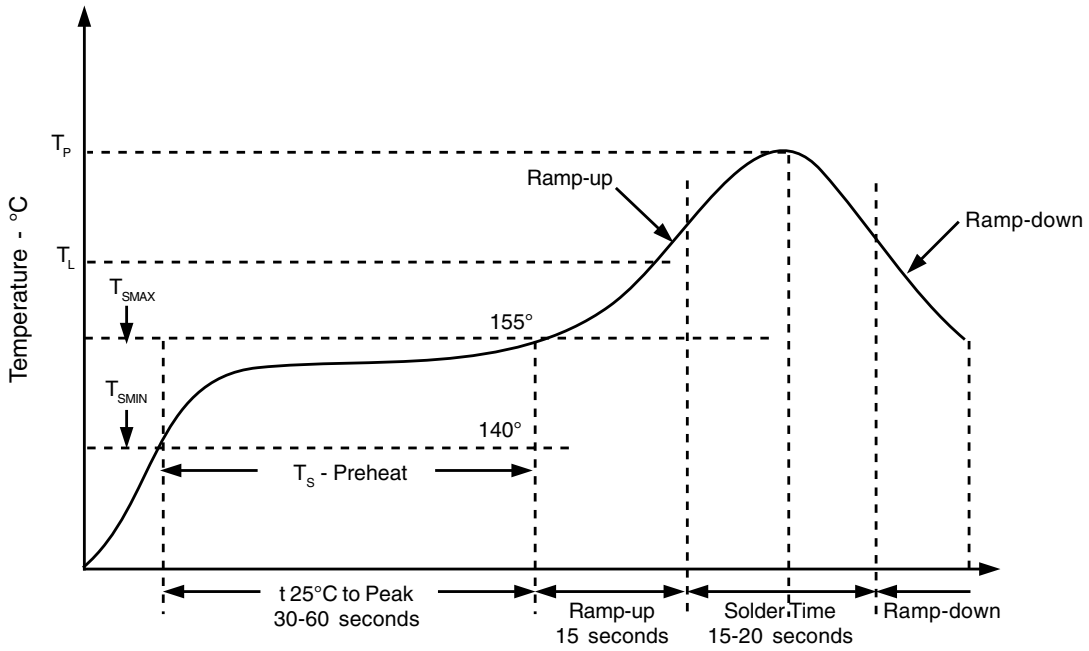
PRINTED CIRCUIT BOARD RECOMMENDATIONS	
PARAMETER	VALUE
Pad Size on PCB	0.275mm
Pad Shape	Round
Pad Definition	Non-Solder Mask Defined Pads
Solder Mask Opening	0.325mm Round
Solder Stencil Thickness	0.150mm
Solder Stencil Aperture Opening (laser cut, 5% tapered walls)	0.330mm Round
Solder Paste Type	No Clean
Pad Protective Finish	OSP(Entek Cu Plus 106A)
Tolerance - Edge To Corner Ball	±50µm
Solder Ball Side Coplanarity	±20µm
Maximum Dwell Time Above Liquidous (183°C)	60 Seconds
Soldering Maximum Temperature	270°C

REQUIREMENTS

Temperature:
T_P for Lead-Free (SnAgCu): 260-270°C
T_P for Tin-Lead: 240-245°C
Preheat time and temperature depends on solder paste and flux activation temperature, component size, weight, surface area & plating.

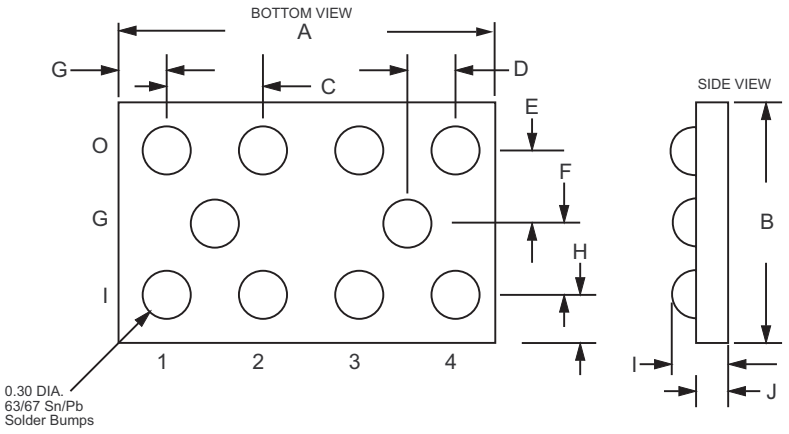
RECOMMENDED NON-SOLDER MASK DEFINED PAD ILLUSTRATION





10 BUMP FLIP CHIP PACKAGE OUTLINE & DIMENSIONS

PACKAGE OUTLINE



PACKAGE DIMENSIONS

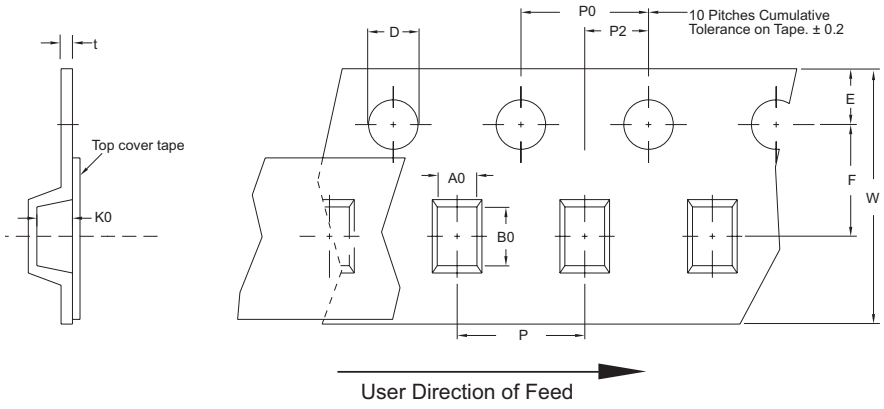
DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	1.981	2.032	0.0780	0.0800
B	1.285	1.375	0.0506	0.0541
C	0.495	0.505	0.0195	0.0199
D	0.245	0.255	0.0096	0.0100
E	0.430	0.440	0.0169	0.0173
F	0.430	0.440	0.0169	0.0173
G	0.180	0.280	0.0071	0.0110
H	0.180	0.280	0.0071	0.0110
I	0.432	0.559	0.0170	0.0220
J	0.330	0.457	0.0130	0.0180

NOTE:
1. Controlling dimensions in millimeters.

Outline & Dimensions: Rev 1 - 8/05, 06060

Tape & Reel Specifications (Dimensions in millimeters)

Reel Dia.	Tape Width	A0	B0	K0	D	E	F	W	P0	P2	P	t
178mm (7")	8mm	1.78 ± 0.05	2.18 ± 0.05	0.51 ± 0.05	1.50 ± 0.10	1.75 ± 0.10	3.50 ± 0.05	8.00 ±0.30	4.00 ±0.10	2.00 ±0.05	4.00 ±0.10	0.20±0.025



TAPE & REEL ORDERING NOMENCLATURE

1. Surface mount product is taped and reeled in accordance with EIA-481.
2. Plastic 8mm Tape: Suffix-T73-1 = 7 Inch Reel - 3,000 pieces per reel, i.e., *EM1402-T73-1.*
3. Suffix - LF - Lead-Free, i.e., *EM1402-LF-T73-1.*
4. Suffix - C - Coated, i.e., EM1402-LF-T73C-1.

ProTek Devices
2929 South Fair Lane, Tempe, AZ 85282
Tel: 602-431-8101 Fax: 602-431-2288
E-Mail: sales@protekdevices.com
Web Site: www.protekdevices.com