PM5946

S/UNI-™ 155-LITE

S/UNI-LITE OPTICAL REFERENCE DESIGN (SORD) ERRATA

ISSUE 3: MARCH 1998

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1 NEW ISSUE OF THE SORD BOARD ERRATA

This document is the errata notice for Issue 2 of the S/UNI-LITE OPTICAL REFERENCE DESIGN (SORD) PM5946 (document number PMC-940106P3).

2 SUMMARY OF CHANGES TO SORD BOARD DOCUMENT PMC-950112

This document includes changes to the S/UNI-LITE loop filter recommendations that are described in the S/UNI-LITE Errata Issue 8, document number PMC-941215.

Also included are recommendations and sources for non-polarized 2.2 uF, 16 V loop filter capacitors. Historically, it has been difficult to obtain 2.2 uF non-polarized capacitors and using two 4.7 uF polarized electrolytics back to back is cumbersome.
Included is a low pass filter circuit recommended to filter out noise from the four power pins, RAVD1, RAVD2, TAVD1 and TAVD2.

Note: all changes below are as follows:

1) Deletions of text are marked with strike through characters

   ~~e.g.. this is a sample of deleted text~~

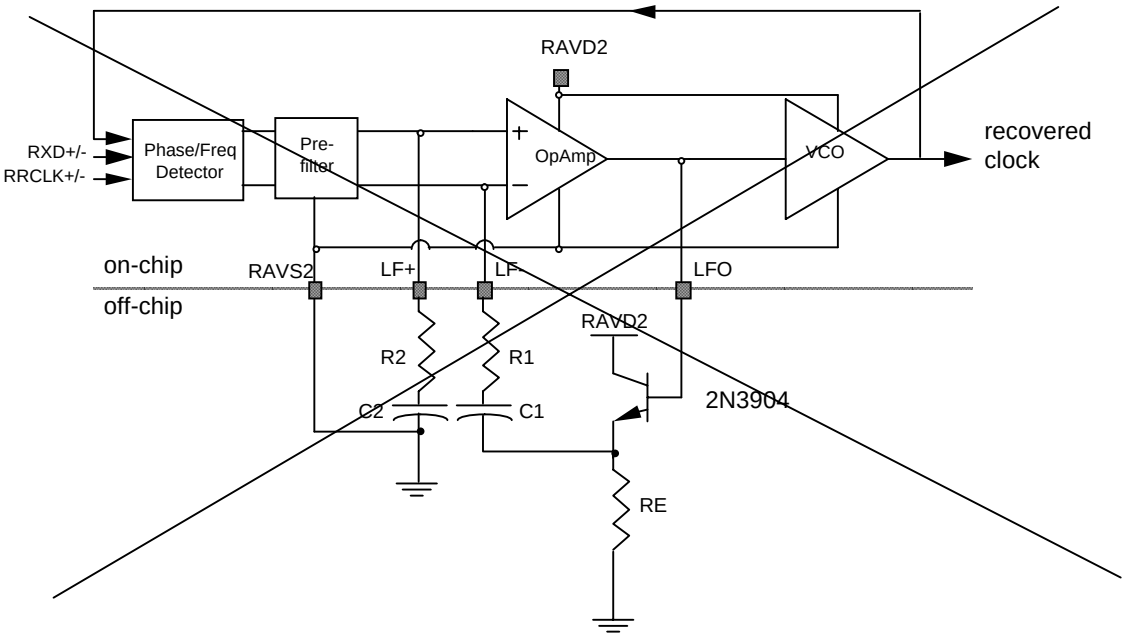
2) All deleted drawings have an X drawn through the affected diagram.
3) Additions are marked with a vertical change bar as seen on the left hand side:

SORD Document Page Number	**Summary of changes.**
11	Delete all text mention of transistor type loop filter.
12	Delete all text and schematic mention of transistor type loop filter.
13	Delete all text mention of transistor type loop filter & add circuit
21	Added functional timing diagram on how XOFF signal is generated using the GFC PAL
51 Appendix E: pg. 2 of 4	Change loop components on the schematic
Appendix C	Update Material List
Schematics	Add power supply filtering for the LITE and Oscillator
	Add a list of small ceramic capacitor vendors

Please see the subsequent sections for detailed description of the changes to the SORD Reference design document.

2.1 Changes to Page 12

To balance the signal paths, R_2 has to be equal to R_2+R_{out} , where R_{out} is the output resistance of the op-amp. If the output resistance of the op-amp is approximately 200 Ohm, R_2 would have to be at least 200 Ohm. ~~However, to meet TR-NWT-000253 jitter transfer mask, R_2 must be less than 95 Ohm. Therefore, the jitter transfer mask cannot be met unless the output resistance of the op-amp is reduced. This can be accomplished with the emitter-follower which buffers the op-amp and presents a reduced output resistance.~~



~~The recommended passive loop filter components are given in Table 1. The recommended transistor is a 2N3904 NPN transistor.~~

~~**Line Rate (Mbit/s)**~~	~~R1 (Ω±1%)~~	~~R2 (Ω±1%)~~	~~C1, C2 min (µF)~~	~~**RE (Ω±1%)**~~	~~**Transfer Function BW (kHz)**~~
~~155.52~~ ~~51.84~~	~~68.1~~ ~~68.1~~	~~90.9~~ ~~90.9~~	~~4.7~~ ~~15~~	~~100~~ ~~100~~	~~80~~ ~~27~~

~~Table 1: Recommended Component Values~~

2.2 Changes to Page 13

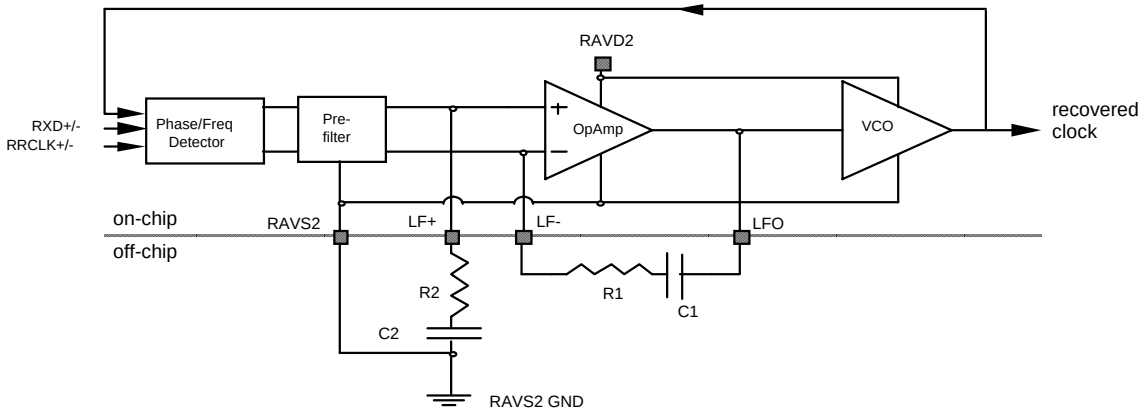
~~The capacitors determine the amount of "peaking" in the jitter transfer curve. "Peaking" refers to jitter amplification by the CRU. The smaller the resistor values, the larger the capacitor value needed to keep the jitter peaking below the 0.1 dB level in the specifications. Using capacitors larger than those recommended will not have any adverse affect on the performance of the S/UNI-LITE. The capacitor values can be ±10%. Additionally, jitter transfer peaking increases as the line rate decreases. Therefore, the capacitors need to be increased in proportion to the decrease in line rate (i.e. half the rate requires twice the capacitance).~~

Since the S/UNI-LITE is a terminating device, it is not a requirement in most applications to meet jitter transfer mask~~. In this case the transistor can be removed~~ and the loop filter components in Table 2 below can be used. The loop filter values were chosen to achieve maximum jitter tolerance performance in the LAN.

Table 2: Recommended Component Values ~~without Transistor~~

Line Rate (Mbit/s)	R1 (Ohm)	R2 (Ohm)	C20, C21 min (µF)	**Transfer Function BW (kHz)**
155.52	200	412	0.15	450
51.84	200	412	0.47	150
25.92	200	412	1.0	75
12.96	200	412	2.2	37.5

Fig:1 Recommended Loop Filter Circuit



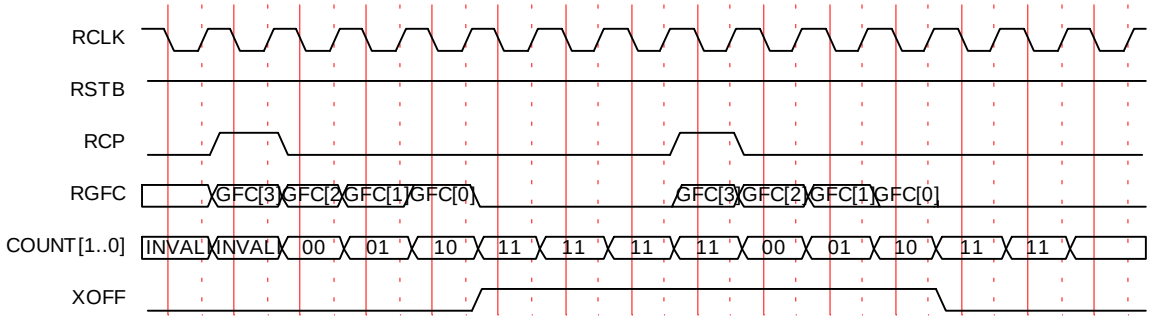
~~PMC document PMC-950139 has a more in-depth discussion of meeting the WAN Interface jitter transfer requirements with the S/UNI-LITE.~~

2.3 Changes to page 3.4. GFC PAL (U9)

The Generic Flow Control (GFC) Pal extracts the GFC bits from the generic flow control (RGFC) serial output port of the S/UNI-LITE. If the GFC[0] bit is high, the PAL will assert the transmit off (XOFF) signal going to the S/UNI-LITE XOFF input. If the XOFF input on the S/UNI-LITE is asserted high, the next cell transmitted is an idle/unassigned cell regardless of the number of cells in the FIFO.

Once the XOFF is asserted, it is held in the same state until the next GFC[0] is received. The following functional diagram indicates how the PAL would generate XOFF based on GFC[0]:

Figure 2: PAL functional diagram



The GFC PAL also puts the S/UNI-LITE in STS-3c/STM-1 mode by asserting the RATE1 and RATE0 input pins of the S/UNI-LITE.

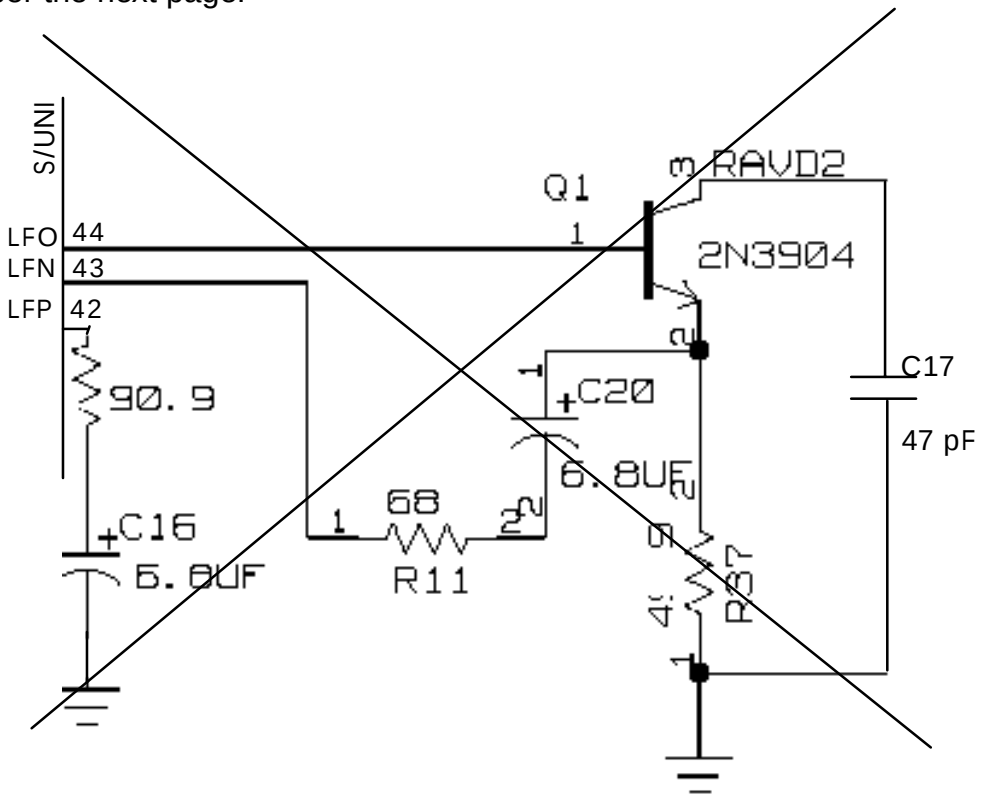
3 SCHEMATIC OF SORD DOCUMENT, APPENDIX: E

An extensive analysis of the loop filter requirements on the S/UNI-LITE was performed. As a result of this analysis, changes were required to Issue 6 of the S/UNI-LITE data sheet.

To maintain consistency, the SORD Reference design must also reflect all data sheet changes. Please refer to Errata Issue 8, PMC-941215 for details which describes changes to the S/UNI-LITE PM5346 Issue 6 Data Sheet.

Essentially, the BJT transistor and 68 ohms, 90.9 ohms and 4.7uF is not recommended for the loop filter. Only the ASYM design as per page 112 of Issue 6 of the PM5346 Data Book is recommended.

The following is the original page out of Appendix E in the SORD document. Notice it includes the transistor Q1 and 6.8 µF capacitors which are changed as per the next page.



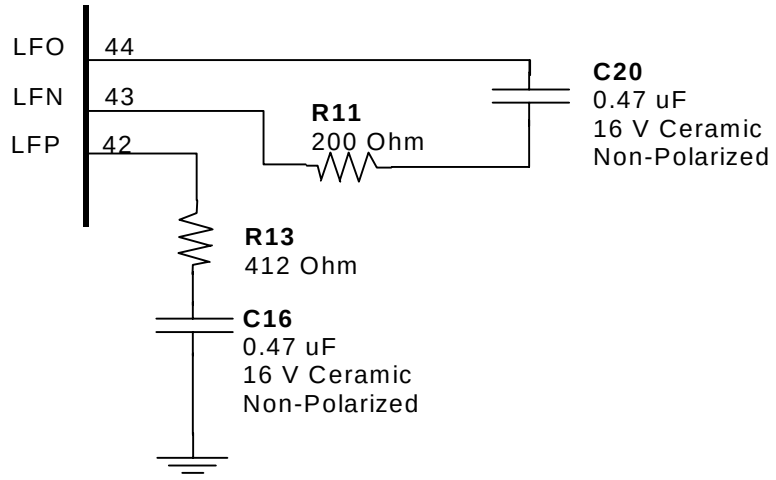
Original Schematic (page 2 of 4)

(see next page for changes to this circuit)

3.1 Changed Schematic of SORD Document Appendix: E

(SCHEMATIC PAGE 2 OF)

S/UNI-LITE



Note: Connect to Rx Ground

Note: Isolate the loop filter from any noise source

1) Delete C17, 47 pF cap
2) Delete Q1, 2N3904
3) Delete R37, 49.9 ohm resistor
4) Change C16 6.8 uF polarized cap to a 0.47 uF 16 V ceramic non-polorized
5) Change C20 6.8 uF polarized cap to a 0.47 uF 16 V ceramic non-polorized
6) Change R13 from 90.9 ohms to 412 ohms
7) Change R11 from 68 ohms to 200 ohms

4) Note: R11 and R13 can be 1/10 Watt SMT devices

4 MATERIAL LIST IN SORD DOCUMENT APPENDIX:C

3.1 page C2 of appendix C (page 42 of total 72 in document)
Item 12, delete C17 (47 pF capacitor)

3.2 page C2 of appendix C (page 42 of total 72 in document)
Item 16, change resistor value of R11 from 68 ohms to 200 ohms

3.3 page C3 of appendix C (page 43 of total 72 in document)
Item 21, change R13 from 90.9 ohms to 412 ohms

3.4 page C3 of appendix C (page 43 of total 72 in document)
Item 22, delete R37 (49.9 ohm resistor)

3.5 page C3 of appendix C (page 43 of total 72 in document)
Item 26, C16 and C20 change from 6.8 uF electrolytic capacitors to 0.47uF unpolarized ceramic 16 VDC capacitors

3.3 page C3 of appendix C (page 43 of total 72 in document)
Item 29, delete Q1 (2N3904 transistor)

5 4.0 NON-POLARIZED 2.2 UF CAPACITORS

Our previous documents recommended using polarized capacitors in some applications to supply the high values required to achieve filter performance. Devices such as a 2.2 or 4.7 uF capacitor were difficult to find in the non-polarized versions. We recommend 2.2 uF for line rates of 12.96 Mbit/s as per our S/UNI-LITE documents.

Recently several vendors started supplying ceramic capacitors that are ideal in our application. These devices are small surface mount ceramic capacitors available in 16VDC and even 10VDC range. Previously these devices were only available in 50 VDC material such as X7R, or Z5U types.

These new devices are composed of Y5U and Y5V material and are available in values from 0.1 to 22 uF in either 10 or 16 VDC .

Manufacturer list of Y5U and Y5V low voltage unpolarized capacitors:

1) Tokin America Inc., 408-432-8020
2) American Technical Ceramics, 516-547-5700
3) AVX Corporation
4) muRata Electronics North America Inc., 1-800-832-9172

6 POWER SUPPLY FILTERING REDUCES JITTER

6.1 Filter Circuit for PM5346 Analog Power Pins

We have found that it may be desirable to include a low frequency power supply filter circuit, especially if powered by a switching power supply. This circuit is recommended to reduce noise seen by the S/UNI-LITE four analog power pins TAVD1, TAVD2, RAVD1, RAVD2. All the other power pins must be de-coupled as recommended in the SORD Board reference design schematic, as per document PMC-950112 (R2). This modification will improve jitter performance.

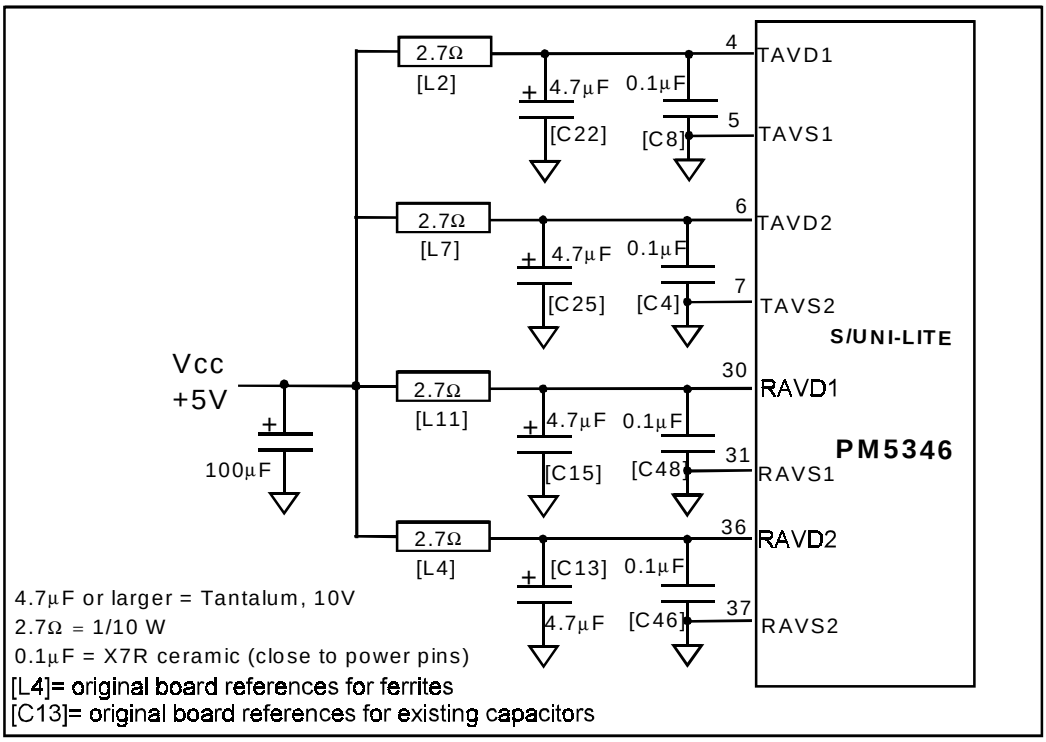
The final analog power supply filter circuit should look like fig. 1 below. Optional ferrites may be used in series with each 2.7ohm resistor to reduce EMI. The recommended ferrites are made by Fair-Rite Corporation, P.N.# 2743019447.

The original schematic on page 3 of 4 must be modified as follows:

1) Replace ferrites L2, L7, L11 and L4 with a 2.7 ohm , 1/10W, 5% resistor.
2) Replace capacitors C22, C25, C13, and C11 with a 4.7µF or larger, 10V Tantalum
3) Replace capacitors C8, C4, C48 and C45 with a 0.1µF Ceramic X7R.
4) The new 0.01 µF caps should be closest to the IC power pins.

The new low pass power supply filtering should be implemented as follows:

Fig.2: S/UNI-LITE' ANALOG POWER SUPPLY FILTERING



6.2 Filter Circuit for 19.44MHz Oscillator Power Supply

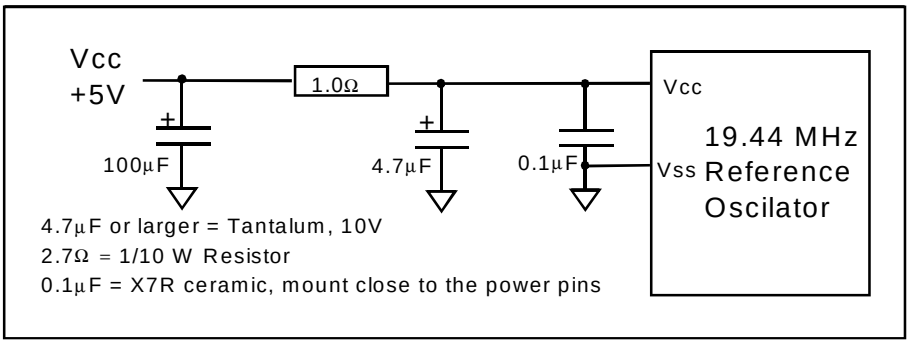
Oscillators are susceptible to noise on their power supply pins. The following change is recommended especially if powered by a switching power supply. The original schematic on page 1 of 4 in Appendix E of the PMC-950112 (R2) must be modified as follows:

1) Replace L8 with a 1.0 Ω resistor.
2) Replace 0.01µF capacitor C32 with a 4.7µF or larger, 10V Tantalum.
3) Replace 0.001µF capacitor, C30 with a 0.1µF X7R Ceramic.
4) There should also be a 100µF bulk capacitor near by on the +5 Volt power supply

Make sure the 0.1µF capacitors are close to the IC pins. The 1.0Ω resistor can be a low power 1/10 watt.

The final power supply low pass circuit is shown below in fig. 2:

Fig.2: OSCILLATOR POWER SUPPLY FILTERING



7 SMALL CERAMIC MULTI-LAYER X7R AND X5R CAPACITOR SOURCES

- ±20 % and ± 10% basic tolerance
- Stable X7R ±15% temperature spec
- X7R from-55 to +125°C, X5R from -55°C to +85°C
- Surface Mount, extremely small size, un-polarized

Manufacturer	Distributor's PN#	µF	%	Type	DCV	Footprint	Thick
TDK	CC1206JX5R475K	4.7	10%	X5R	6.3V	1206 (0.12" by .06")	
	(internal Manufacturer's PN # C3216X5R0J475K)						
	TDK Corp. of America: 1600 Feehanville Drive, Mount Prospect, Ill. USA 60056						
	1996 Edition Electronic Components Distributor Catalog page 15-20						
	Phone: (847) 803-6100 FAX: (847) 803-6296						
	Distributor: Enerlec Sales, Brenda, Richmond BC, Canada, 604-273-0882						
Taiyo Yuden Inc.	EMK325BJ475MN-B	4.7	20%	X5R	16V	1210 (0.12" by .10")	1.9mm
	EMK325BJ475KN-B	4.7	10%	X5R	16V	1210 (0.12" by .10")	1.9mm
	EMK316BJ475ML-B	4.7	20%	X5R	10V	1206 (0.12" by .06")	1.6mm
	EMK316BJ475KL-B	4.7	10%	X5R	10V	1206 (0.12" by .06")	1.6mm
	Manufacturer: Taiyo Yuden Inc. , 16-20 Ueno 6-chome, Taito-ku, Tokyo, Japan						
	Phone: 03-3833-5441, FAX: 03-3835-4754						
	Rep.: Ty Bowman, Chicago, USA, 847-925-0888						
	Distributor :						
	Canada; Electro Source, 6875 Royal Oak Rd., Burnaby BC,						
	604-435-2533						
	UK; Taiyo Yuden Westfield. London Road, High Wy. Combe Buckingham Shire HP11,1MA						
	Phone:(44) 1494-464642 FAX: (44) 1494-474743						
PHILIPS	2220RR475J8AB0C	4.7	5%	X7R	25V	2220 (0.22" by .20")	
	2220RR475K8AB0C	4.7	10%	X7R	25V	2220 (0.22" by .20")	
	2220RR475M8AB0C	4.7	20%	X7R	25V	2220 (0.22" by .20")	
	Philips Electronics Ltd., 601 Milner Avenue, Scarborough, Ontario, Canada						
	Compact X7R Series Catalog						
	PHONE (416) 292-5161 FAX: (416) 292-4477						
AVX	SM015C475KAJ240	4.7		X7R	50V	3230 (0.32" by .30")	
	AVX Corporation, Myrtle Beach, SC USA, SMPS Series Capacitors Catalog						
	Phone: (803) 448-9411 FAX: (803) 448-1943						
	AVX Limited, Aldershot England						
	Phone: (252-336868 FAX: 252-346643						
Prestidio	3736X7R475K1NT91A	4.7		X7R	25V	3736 (0.37" by .36")	
	Prestidio Components Inc., 7169 Construction Court, San Diego, CA USA 92121						
	EEM 1997 Catalog; page A1122-1123						
	Phone: (619) 578-9390 FAX: 1-800-538-3880						
Vitramon	VJ2225Y475KXXAT	4.7		X7R	25V	2225 (0.22" by .25")	
	Manufacturer: Vitramon, #10 Route 25, Monroe, CT 06468, Mail: PO Box 544, CT 06601						
	Phone (203) 268-6261 FAX: (203) 452-5670						

8 THERMAL GROUNDS

As indicated in the current issue of the data sheet for the S/UNI-155-LITE, the thermal grounds (VSS1-VSS13) provide a low thermal resistance for the dissipated heat. These pins must be connected to digital GND for correct operation.

Thermal ground pins VSS(9:13) should be connected to the same ground plane (VSSG) as thermal ground pins VSS(1:8) (Refer to the SORD reference design schematic issue 3).

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