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October 28, 2013

Re: HALO Conversion from ROHS compliance to ROHS compliance and Lead Free

Dear Valued HALO Customers,

The ROHS directive is expected to change the status of exemption 7a in the not too distant future. This exemption has allowed component manufacturers to use high lead content solders in the internal solder joints. HALO's RL suffix parts have been using this exemption and we have been actively working on our conversion process for many of our high volume parts. The TG110-E050N5RL and TG110-S050N2RL are two examples where we have made the conversion to the Lead Free versions. The new part numbers are TG110-E050N5LF and TG110-S050N2LF. Both parts are in full production now.

During the next few quarters HALO will be phasing out the RL versions and focusing solely on the LF versions of these two part numbers. Other part numbers are also now available in Lead Free and over time we will be phasing out the RL versions of many additional part numbers with the goal that by the time the ROHS directive eliminates the 7a exemption we will have all part numbers available in Lead Free and that our customers will be fully converted with plenty of time to push older product through the supply chain before the expiration date. For more information pertaining to other part numbers please contact your local HALO representative or franchised distributor.

As a result of this migration to Lead Free we are requesting our customers approve the LF versions as soon as possible. There is no degradation to the electrical performance. As well, there are no changes to the package dimensions. Datasheets are attached of both the RL and LF drawings for your convenience.

Sincerely,

A handwritten signature in black ink, appearing to read "Jeffrey R. Heaton", is written over a horizontal line.

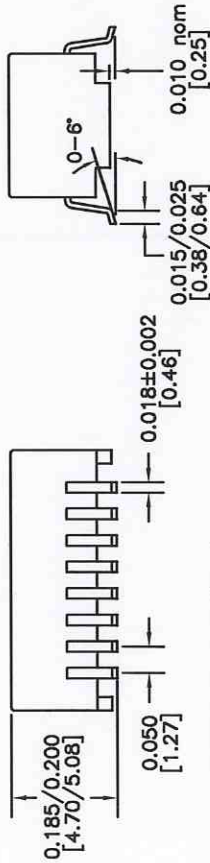
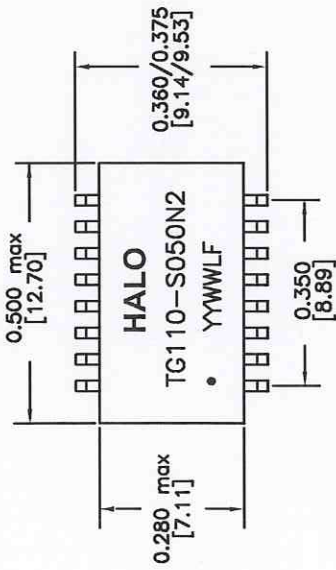
Jeffrey R. Heaton
Vice President

"Solutions that Keep You Connected"

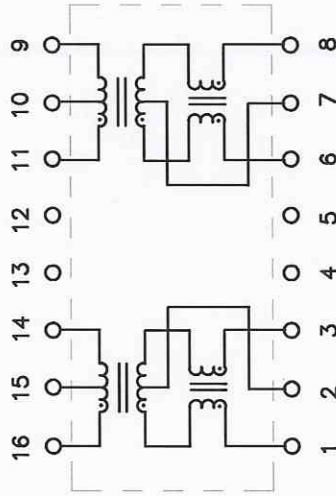


PART NO. : TG110-S050N2LF

16PIN SMT 10/100BASE-TX ISOLATION MODULE
FOR IEEE802.3u APPLICATIONS
Pb-FREE/ROHS COMPLIANT, "GREEN PRODUCT"
COMPATIBLE TO LEAD-FREE SOLDERING PROCESS
CONDITION PER IPC/JEDEC J-STD-020C
OPERATING TEMPERATURE 0/+70°C *



DIMENSIONS: Inch [mm]
CO-PLANARITY: 0.004 [0.10]
TOLERANCES: ±0.005 INCH IF NOT SPECIFIED



ELECTRICAL SPECIFICATIONS @25°C

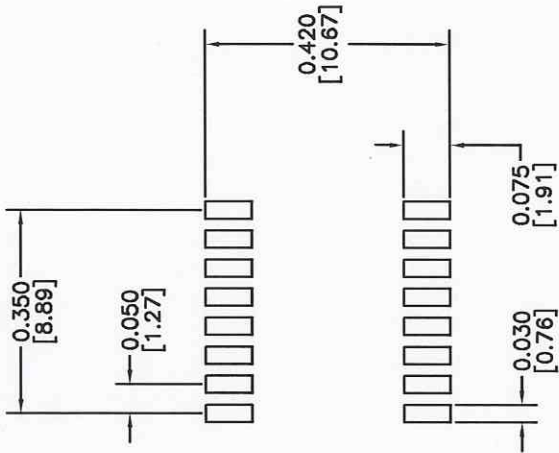
- Turns Ratio
P1-3:P16-14
P6-8:P11-9
OCL (100KHz,0.1Vrms,8mA)
P1-3,P6-8
DCR P9-11,P14-16
LL P1-3,P6-8
Cw/w
Insertion Loss
0.1-100MHz
Return Loss
0.5-30MHz
40MHz
50MHz
60-80MHz
Crosstalk 0.1-100MHz
CMR 0.1-100MHz
Isolation
1,500Vrms
- 1CT:1CT ±3%
1CT:1CT ±3%
350µH min
0.9Ω max
0.4µH max
35pF max
-1.1dB max
-18dB min
-15.5dB min
-13.6dB min
-12dB min
-40dB typ
-40dB typ
1,500Vrms

* THIS TRANSFORMER MODULE WILL FUNCTIONALLY WORK AT
-40/+85°C TEMPERATURE, EXCEPT MEETING MINIMUM OCL



TITLE		TRANSFORMER "ULTRA" SERIES		SIGNATURES		DATE		REV.		DESC.		DATE	
HALO/PBL		FOR FAST ETHERNET		DRAWN LI ZHI ZHONG		12/21/05		A		FIRST ISSUE		12/21/05	
PART NO. TG110-S050N2LF		SCALE NONE		CHECKED LEI KEONG		9/23/13		B		PROD. RELEASE		10/8/09	
PAGE 1 OF 2				APPROVED PETER LU		9/23/13		C		ADD TEMP NOTE		9/23/13	
				FILE S050N2LF.DWG									

CALIFORNIA, USA
KOWLOON, HONG KONG
SINGAPORE



RECOMMENDED SOLDER PAD DIMENSIONS
 DIMENSIONS: Inch [mm]

HALO/PBL CALIFORNIA, USA KOWLOON, HONG KONG SINGAPORE	TITLE	TRANSFORMER "ULTRA" SERIES	SIGNATURES	DATE	REV.	DESC.	DATE
	FOR	FAST ETHERNET	DRAWN LI ZHI ZHONG	12/21/05	A	FIRST ISSUE	12/21/05
	PART NO.	TG110-S050N2LF	CHECKED LEI KEONG	9/23/13	B	PROD. RELEASE	10/8/09
	SCALE	NONE	APPROVED PETER LU	9/23/13	C	ADD TEMP NOTE	9/23/13
		PAGE	FILE				
		2 of 2	S050N2LF.DWG				



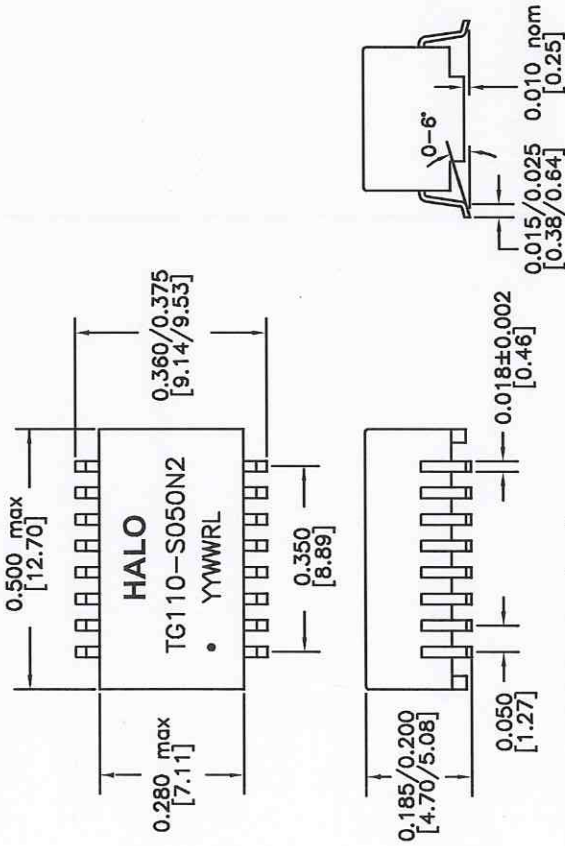
PART NO. : TG110-S050N2RL

16PIN ISOLATION MODULE FOR 10/100BASE-TX
IEEE802.3u APPLICATIONS
RoHS COMPLIANT

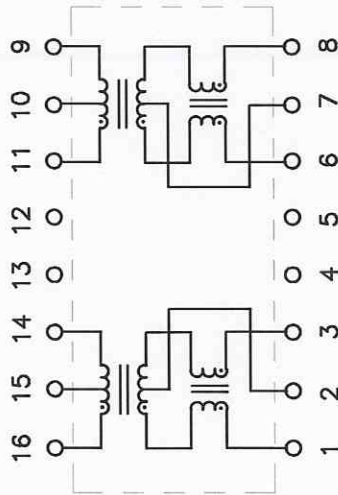
COMPATIBLE TO LEAD-FREE SOLDERING PROCESS
CONDITION PER IPC/JEDEC J-STD-020C
UL/EN60950 AND DEMKO RECOGNIZED
OPERATING TEMPERATURE 0/+70°C *

ELECTRICAL SPECIFICATIONS @25°C

- 1CT:1CT ±3%
1CT:1CT ±3%
- 350µH min
0.9Ω max
0.4µH max
35pF max
-1.1dB max
- 18dB min
-15.5dB min
-13.6dB min
-12dB min
-40dB typ
-40dB typ
1,500Vrms
- 1CT:1CT ±3%
1CT:1CT ±3%
- 350µH min
0.9Ω max
0.4µH max
35pF max
-1.1dB max
- 18dB min
-15.5dB min
-13.6dB min
-12dB min
-40dB typ
-40dB typ
1,500Vrms



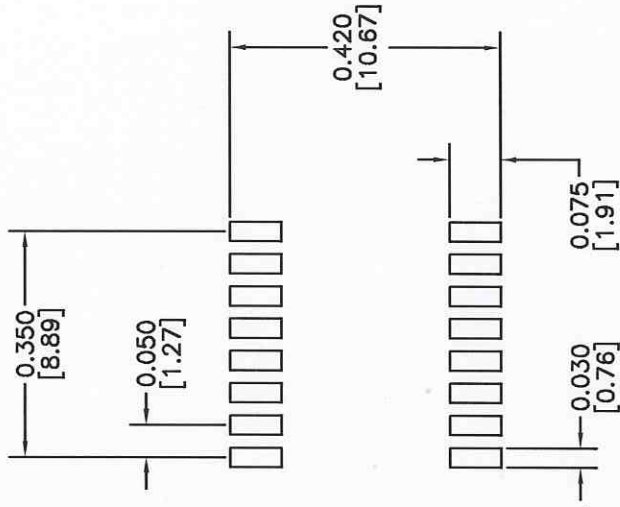
DIMENSIONS: Inch [mm]
CO-PLANARITY: 0.004 [0.10]
TOLERANCES: ±0.005 INCH IF NOT SPECIFIED



* THIS TRANSFORMER MODULE WILL FUNCTIONALLY WORK AT
-40/+85°C TEMPERATURE, EXCEPT MEETING MINIMUM OCL



TITLE		TRANSFORMER "ULTRA" SERIES		SIGNATURES		DATE	REV.	DESC.	DATE
HALO/PBL		FOR FAST ETHERNET		DRAWN	LI ZHI ZHONG	4/15/04	E	ADD TEMP NOTE	4/29/05
PART NO. TG110-S050N2RL		SCALE NONE		CHECKED	LEI KEONG	8/10/10	F	PROD. RELEASE	9/7/05
PAGE 1 OF 2		PAGE 1 OF 2		APPROVED	PETER LU	8/10/10	G	ADD UL MARKING	4/30/07
CALIFORNIA, USA KOWLOON, HONG KONG SINGAPORE		SCALE NONE		FILE	S050N2RL.DWG		H	UPDATE MARKING	8/10/10



RECOMMENDED SOLDER PAD DIMENSIONS
 DIMENSIONS: Inch [mm]

HALO/PBL CALIFORNIA, USA KOWLOON, HONG KONG SINGAPORE	TITLE	TRANSFORMER "ULTRA" SERIES	SIGNATURES	DATE	REV.	DESC.	DATE	
	FOR	FAST ETHERNET	DRAWN LI ZHI ZHONG	4/15/04	E	ADD TEMP NOTE	4/29/05	
	PART NO.	TG110-S050N2RL	CHECKED LEI KEONG	8/10/10	F	PROD. RELEASE	9/7/05	
	SCALE	NONE	APPROVED PETER LU	8/10/10	G	ADD UL MARKING	4/30/07	
		PAGE	2 of 2	FILE	S050N2RL.DWG	H	UPDATE MARKING	8/10/10

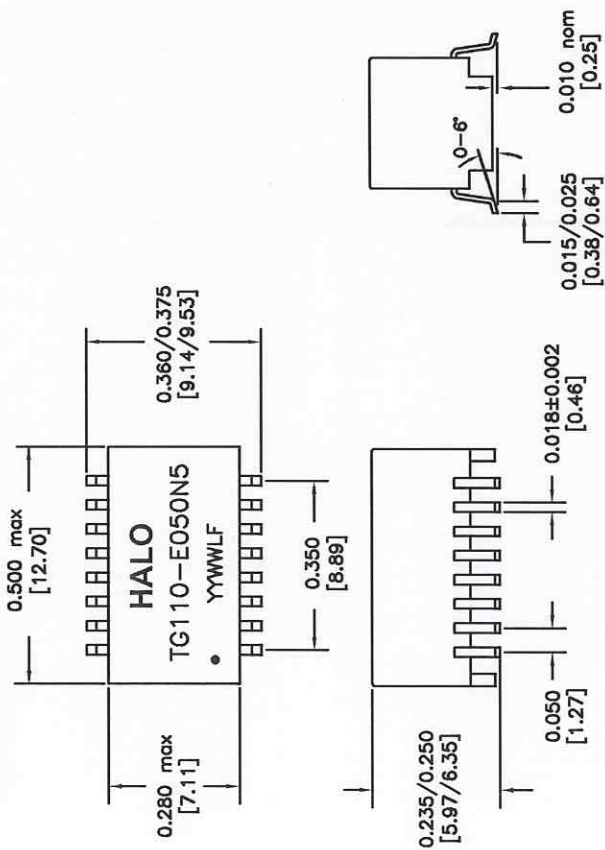


PART NO. : TG110-E050N5LF

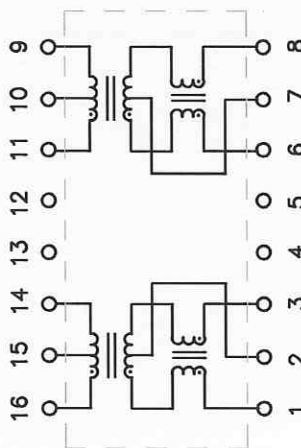
16PIN SMT ISOLATION MODULE FOR
10/100BASE-TX APPLICATIONS
Pb-FREE/RoHS COMPLIANT
COMPATIBLE TO LEAD-FREE SOLDERING PROCESS
CONDITION PER IPC/JEDEC J-STD-020C
EXTENDED OPERATING TEMPERATURE -40/+85°C

ELECTRICAL SPECIFICATIONS @25°C

TURNS RATIO
 P1-3:P16-14 1CT:1CT ±3%
 P6-8:P11-9 1CT:1CT ±3%
 OCL (100KHz,0.1Vrms,8mA)
 P1-3,P6-8 350µH min
 DCR P9-11,P14-16 1.0Ω max
 LL P1-3,P6-8 0.4µH max
 Cw/w 35pF max
 INSERTION LOSS -1.1dB max
 0.1-100MHZ
 RETURN LOSS -18dB min
 0.5-30MHZ -15.5dB min
 40MHZ -13.6dB min
 50MHZ -12dB min
 60-80MHZ
 CROSSTALK 0.1-100MHZ -40dB typ
 CMR 0.1-100MHZ -40dB typ
 ISOLATION 1,500Vrms



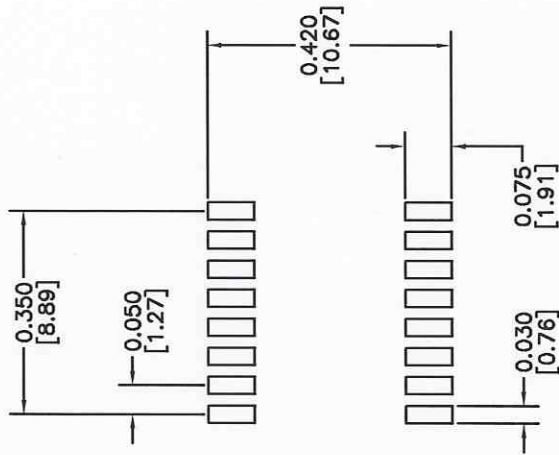
DIMENSIONS: Inch [mm]
 CO-PLANARITY: 0.004 [0.10]
 TOLERANCES: ±0.005 INCH IF NOT SPECIFIED



TITLE		ISOLATION MODULE		SIGNATURES		DATE		REV.		DESC.		DATE	
FOR		FAST ETHERNET		DRAWN	LI ZHI ZHONG	10/2/08	A	FIRST ISSUE	10/2/08				
PART NO.		TG110-E050N5LF		CHECKED	LEI KEONG	10/18/11	B	PROD. RELEASE	10/18/11				
SCALE		NONE		APPROVED	PETER LU	10/18/11							
		PAGE		FILE	E050N5LF.DWG								
		1 OF 2											

HALO/PBL

CALIFORNIA, USA
KOWLOON, HONG KONG
SINGAPORE



RECOMMENDED SOLDER PAD DIMENSIONS
 DIMENSIONS: Inch [mm]

HALO/PBL CALIFORNIA, USA KOWLOON, HONG KONG SINGAPORE	TITLE	ISOLATION MODULE	SIGNATURES	DATE	REV.	DESC.	DATE
	FOR	FAST ETHERNET	DRAWN LI ZHI ZHONG	10/2/08	A	FIRST ISSUE	10/2/08
	PART NO.	TG110-E050N5LF	CHECKED LEI KEONG	10/18/11	B	PROD. RELEASE	10/18/11
	SCALE	NONE	APPROVED PETER LU	10/18/11			
		PAGE	FILE				
		2 OF 2	E050N5LF.DWG				

US PATENT NO. 5,655,965 6,297,720B1 6,297,721B1
 6,320,499B1 6,344,765B1 6,662,431B1

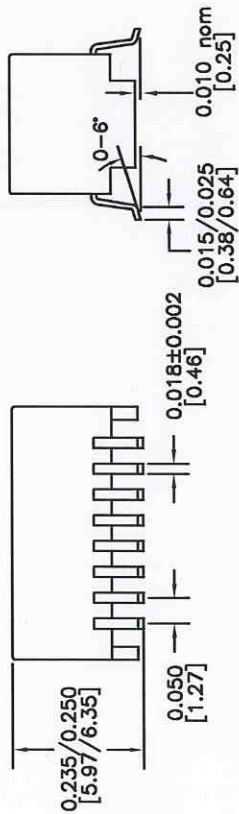
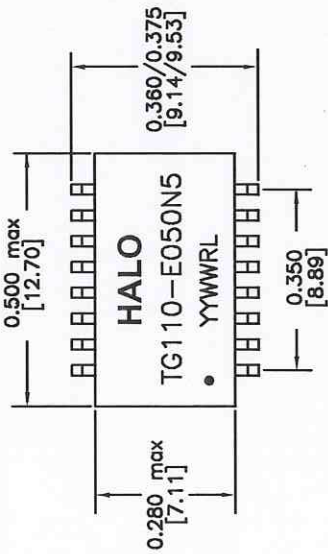


PART NO. : TG110-E050N5RL

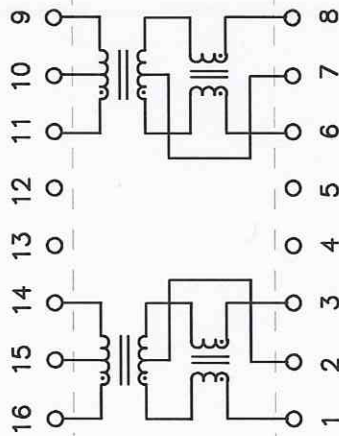
16PIN SMT ISOLATION MODULE FOR 10/100BASE-TX
 IEEE802.3u APPLICATIONS

RoHS COMPLIANT

COMPATIBLE TO LEAD-FREE SOLDERING PROCESS
 CONDITION PER IPC/JEDEC J-STANDARD-020C
 EXTENDED OPERATING TEMPERATURE -40/+85°C



DIMENSIONS: Inch [mm]
 CO-PLANARITY: 0.004 [0.10]
 TOLERANCES: ±0.005 INCH IF NOT SPECIFIED



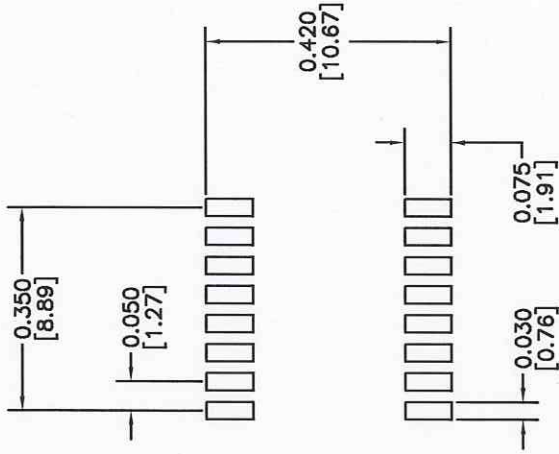
ELECTRICAL SPECIFICATIONS @25° C

- URNS RATIO
 - P1-3:P16-14 1CT:1CT ±3%
 - P6-8:P11-9 1CT:1CT ±3%
- OCL (100KHz,0.1Vrms,8mA)
 - P1-3,P6-8 350µH min*
- DCR P11-9,P16-14 1.0Ω max
- LL P1-3,P6-8 0.4µH max
- Cw/w 40pF max
- INSERTION LOSS -1.1dB max
- RETURN LOSS
 - 0.1-100MHZ -18dB min
 - 0.5-30MHZ -15.5dB min
 - 40MHZ -13.6dB min
 - 50MHZ -12dB min
 - 60-80MHZ -40dB typ
- CROSSTALK 0.1-100MHZ -40dB typ
- CMR 0.1-100MHZ -40dB typ
- ISOLATION 1,500Vrms

* MINIMUM OCL OVER OPERATING TEMPERATURE



HALO/PBL	TITLE	TRANSFORMER MODULE	SIGNATURES	DATE	REV.	DESC.	DATE	
	FOR	FAST ETHERNET	DRAWN	LI ZHI ZHONG	6/3/04	C	REVISE CMR	4/25/05
	PART NO.	TG110-E050N5RL	CHECKED	LEI KEONG	8/10/10	D	ADD SOLDER PAD DIM	4/28/05
	SCALE	NONE	APPROVED	PETER LU	8/10/10	E	PROD. RELEASE	4/30/05
CALIFORNIA, USA KOWLOON, HONG KONG SINGAPORE			FILE	E050N5RL.DWG	F	UPDATE MARKING	8/10/10	



RECOMMENDED SOLDER PAD DIMENSIONS
 DIMENSIONS: Inch [mm]

TITLE		TRANSFORMER MODULE		SIGNATURES		DATE	REV.	DESC.	DATE
FOR		FAST ETHERNET		DRAWN	LI ZHI ZHONG	6/3/04	C	REVISE CMR	4/25/05
PART NO.		TG110-E050N5RL		CHECKED	LEI KEONG	8/10/10	D	ADD SOLDER PAD DIM	4/28/05
SCALE		NONE		APPROVED	PETER LU	8/10/10	E	PROD. RELEASE	4/30/05
		PAGE 2 OF 2		FILE	E050N5RL.DWG		F	UPDATE MARKING	8/10/10

HALO/PBL

CALIFORNIA, USA
 KOWLOON, HONG KONG
 SINGAPORE