Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

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Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

CLEARCLOCK™ | POWER OPTIMIZED 0.12ps 5x7mm XO

AX7

7.0 x 5.0 x 1.8 mm

RoHS/RoHS II Compliant

MSL = 1

ESD SENSITIVE

FEATURES

- 0.125ps typ jitter (150fs MAX f > 200MHz, 25°C)
- Highest in-class frequency range from 50 to 2100MHz
- Excellent spurious suppresion
- 70mA MAX I_{DD} (LVDS, any V_{DD})
- Lowest in-class power consumption
- Supports LVPECL, HCSL, LVDS, CML
- Supports ±50ppm or ±100ppm all inclusive stability
- -40°C to 85°C or -20°C to 70°C operation
- Industry standard 5x7mm footprint

APPLICATIONS

- Networking and communications
- RF systems, base stations (BTS)
- Test and measurement
- Cloud, server and storage, Fibre Channel
- 100/400GbEthernet
- PCI Express

OPTIONS AND PART IDENTIFICATION [Note 1]

Note 1: Contact Abracon for part number requests with carrier frequency callouts up to 5 & 6 digit accuracy after the decimal.

AX7 ▭ ▭ ▭ ▭ - ▭ ▭

(1): Output Type
P: LVPECL
D: LVDS
H: HCSL (*)
M: CML

(*) Frequency range limited to: 50~700MHz

(2): V_{DD}
A: 3.3V
B: 2.5V
C: 1.8V (*)

(*) Excluding LVPECL output

(3): Stability over OTR
D: ±25ppm over -20°C to +70°C
E: ±50ppm over -20°C to +70°C
F: ±25ppm over -40°C to +85°C
G: ±50ppm over -40°C to +85°C

(4): OE Function
1: OE Pin 1; Active High
2: OE Pin 1; Active Low
3: OE Pin 2; Active High
4: OE Pin 2; Active Low

(5): Output Frequency in MHz
Please specify the Frequency in units of MHz out to **4 digit** accuracy after the decimal. *Example:* "156.2500" = 156.2500MHz

(6): Packaging
Blank: Bulk
C: Cut Tape 50 units
T: Tape & Reel 250 units

Part Number Example:

AX7PAF1-644.53125C

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MSL = 1

ESD SENSITIVE

COMMON KEY ELECTRICAL SPECIFICATIONS

Parameters			Min.	Typ.	Max.	Unit	Notes
Frequency Range	LVPECL		50		2100	MHz	Option “P”
	LVDS		50		2100		Option “D”
	HCSL		50		700		Option “H”
	CML		50		2100		Option “M”
Power Supply Voltage (V_{DD}) [Note 1]			2.97	3.3	3.63	V	Option “A”
			2.25	2.5	2.75		Option “B”
			1.71	1.8	1.89		Option “C”
Current Consumption (I_{DD})	LVPECL			87	94	mA	@ V_{DD}=3.3V
	LVDS			64	70		
	HCSL			75	80		
	CML			63	68		@ V_{DD}=1.8V
Set Tolerance (as received) @ 25°C ±3°C			-5.00	<±3.00	+5.00	ppm	Relative to carrier
Operating Temperature Range (OTR)			-40		+85	°C	*See Options*
Storage Temperature			-55		+155	°C	
Frequency Stability over OTR			-25		+25	ppm	Option “D or F”
			-50		+50		Option “E or G”
Aging over 10-Year Product Life [Note 2]			-15		+15	ppm	
All Inclusive Frequency Accuracy over 10-Year Product Life [Note 2]			-50		+50	ppm	Specific to freq. stability option “D” or “F” (±25ppm)
			-100		+100		Specific to freq. stability option “E” or “G” (±50ppm)
Rise (Tr) / Fall Time (Tf)	LVPECL/LVDS/CML				0.35	nS	20% ↔ 80% waveform
	HCSL				0.40		
Duty Cycle			45		55	%	@ 50% V_{DD}
Start-up Time [Note 2]				< 5.0	10	ms	
Output High Voltage (V_{OH}) Output Low Voltage (V_{OL})	LVPECL	V_{OH}	V_{DD}-1.165		V_{DD}-0.8	V	50Ω into V_{DD}–2.0V or thevenin equivalent
		V_{OL}	V_{DD}-2.0		V_{DD}-1.55		
	LVDS	V_{OH}		1.4	1.6		100Ω between OUT and OUTN
		V_{OL}	0.9	1.1			
	HCSL	V_{OH}	0.66		1.15		50Ω to V_{DD}
		V_{OL}	0.0		0.15		
	CML	V_{OH}	V_{DD}-0.085		V_{DD}=Max		50Ω into GND
		V_{OL}	V_{DD}-0.6		V_{DD}-0.32		
Output Enable (OE) Control			0.8*(V_{DD})			V	
					0.2*(V_{DD})		

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RoHS/RoHS II Compliant

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ESD SENSITIVE

COMMON KEY ELECTRICAL SPECIFICATIONS

PARAMETERS		MIN.	TYP.	MAX.	UNIT	NOTES
Output Enable Time				2.5	ms	
Output Disable Time				10	µs	
Output Disable Current Consumption	LVPECL		85	86	mA	@ V_{dd}=3.3V
	LVDS		63	65		
	HCSL		77	78		
	CML		62	67		@ V_{dd}=1.8V
RMS Phase Jitter (12kHz -20MHz BW)						
201.000MHz – 2100.000MHz			125	150	fsec	@ V_{dd}=3.3V
50.000MHz – 200.000MHz			200	300		
156.2500MHz			≤130	200		

Note 1: Supply Voltage (Vdd) = 1.8V option not available with LVPECL output
Note 2: Relative to initial measured frequency @ 25°C ±3°C

TYPICAL PHASE NOISE AND JITTER CHARACTERISTICS (@25°C ± 3°C) [Note 2]

Frequency (MHz)		148.35	150	155.52	156.25	156.25	200	212.5	312.5
RF Output		LVDS	LVPECL	LVPECL	LVPECL	HCSL	LVPECL	LVDS	LVDS
RMS Phase Jitter (fsec) 12kHz-20MHz BW		125	137	124	123	129	122	127	114
Phase Noise (dBc/Hz)	100Hz	-96	-98	-98	-98	-99	-90	-83	-94
	1kHz	-120	-120	-120	-121	-121	-114	-114	-115
	10kHz	-132	-132	-132	-132	-132	-129	-129	-126
	100kHz	-140	-139	-141	-141	-140	-138	-137	-134
	1MHz	-149	-150	-151	-150	-151	-148	-147	-144
	10MHz	-157	-159	-159	-159	-160	-159	-157	-156
	20MHz	-157	-159	-159	-159	-160	-159	-157	-157

Frequency (MHz)		322.265625		491.52	644.53125	1000	1244.16	1500	2100
RF Output		LVPECL	HCSL	LVPECL	LVPECL	LVDS	LVDS	LVDS	LVPECL
RMS Phase Jitter (fsec) 12kHz-20MHz BW		121	121	123	127	114	127	112	138
Phase Noise (dBc/Hz)	100Hz	-91	-92	-91	-77	-76	-78	-79	-77
	1kHz	-113	-114	-111	-107	-102	-102	-101	-98
	10kHz	-125	-125	-122	-119	-115	-113	-112	-108
	100kHz	-133	-133	-131	-127	-124	-122	-120	-117
	1MHz	-144	-144	-138	-138	-134	-131	-130	-124
	10MHz	-157	-157	-154	-154	-150	-149	-145	-145
	20MHz	-159	-159	-154	-155	-152	-150	-145	-148

Note 2: Refer to following Section for selected Phase Noise Plots

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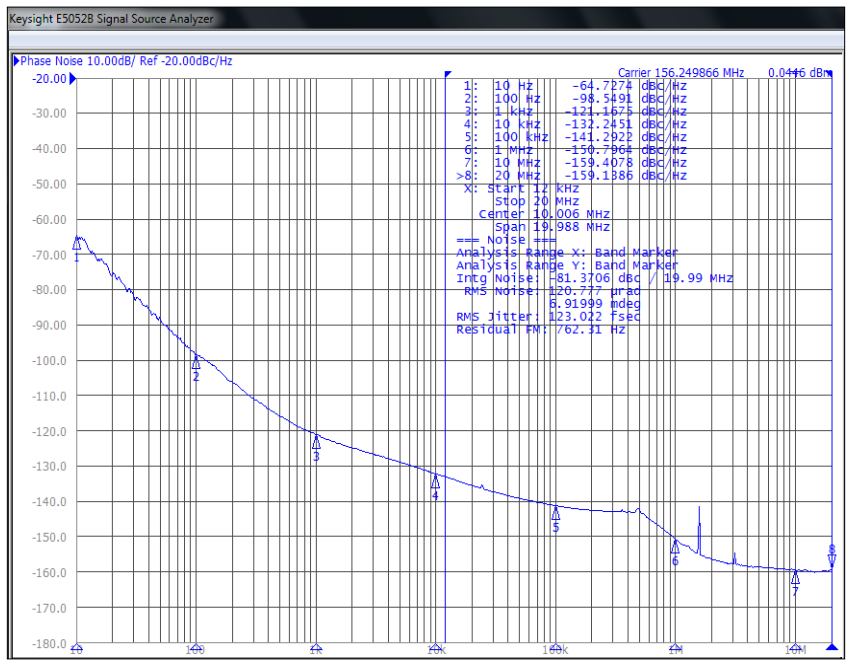
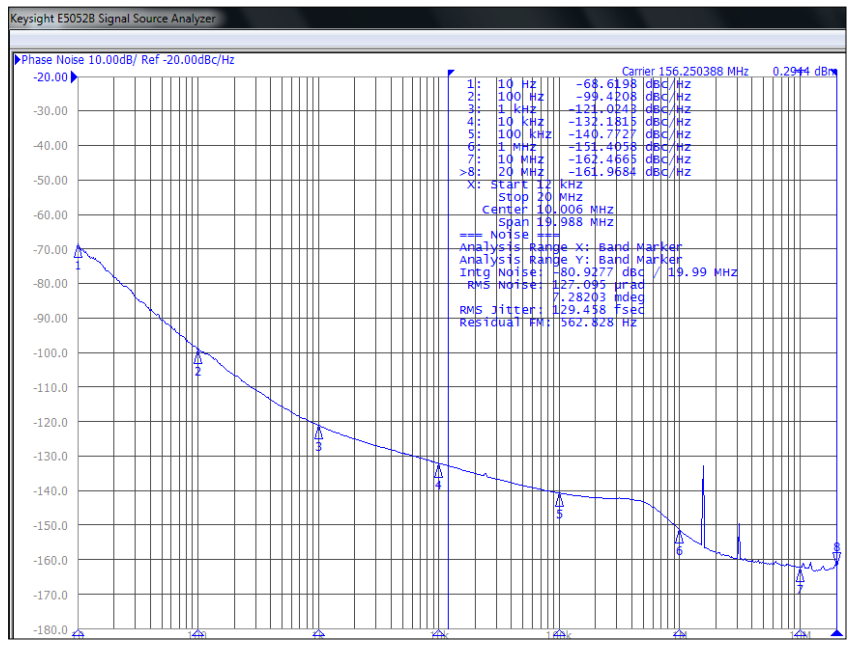
ESD SENSITIVE

SELECTED PHASE NOISE PLOTS (@25°C ± 3°C)

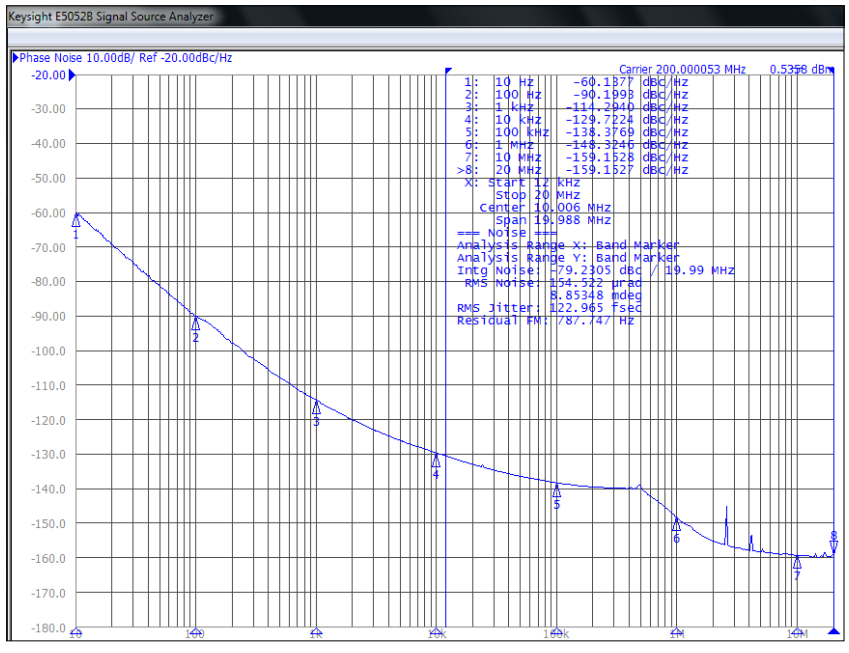
156.25MHz | LVPECL | V_{DD}=3.3V



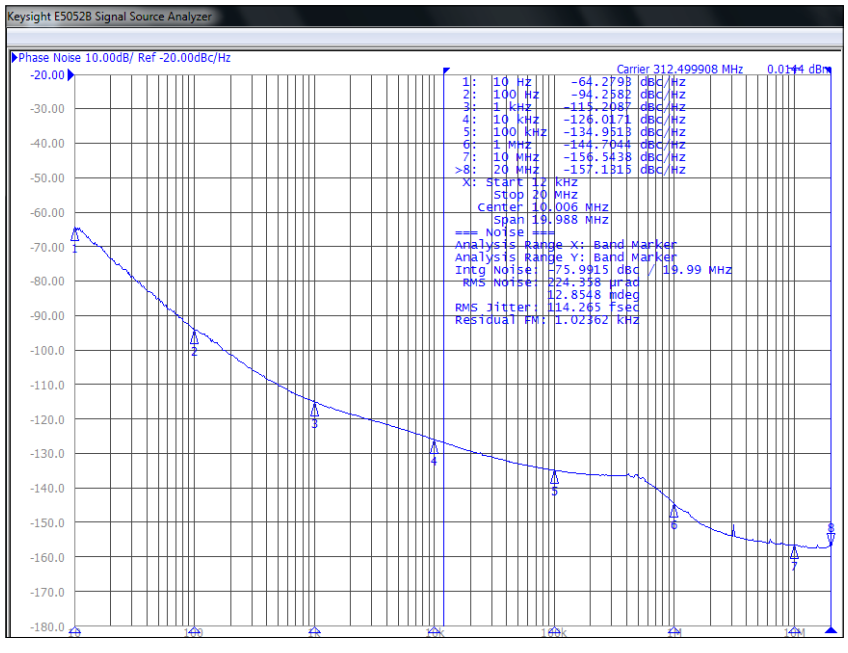
156.25MHz | HCSL | V_{DD}=1.8V



200MHz | LVPECL | V_{DD}=3.3V



312.5MHz | LVDS | V_{DD}=3.3V



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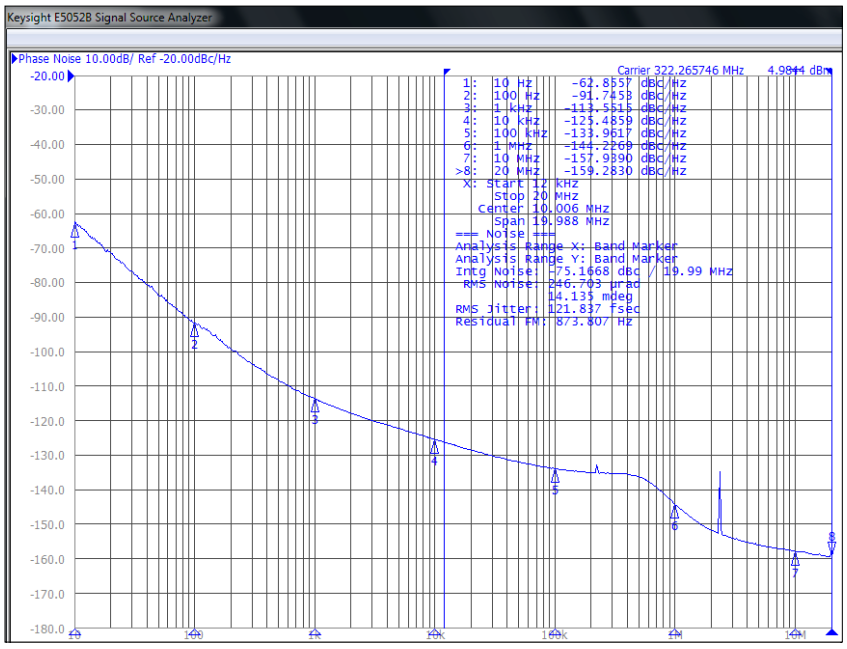
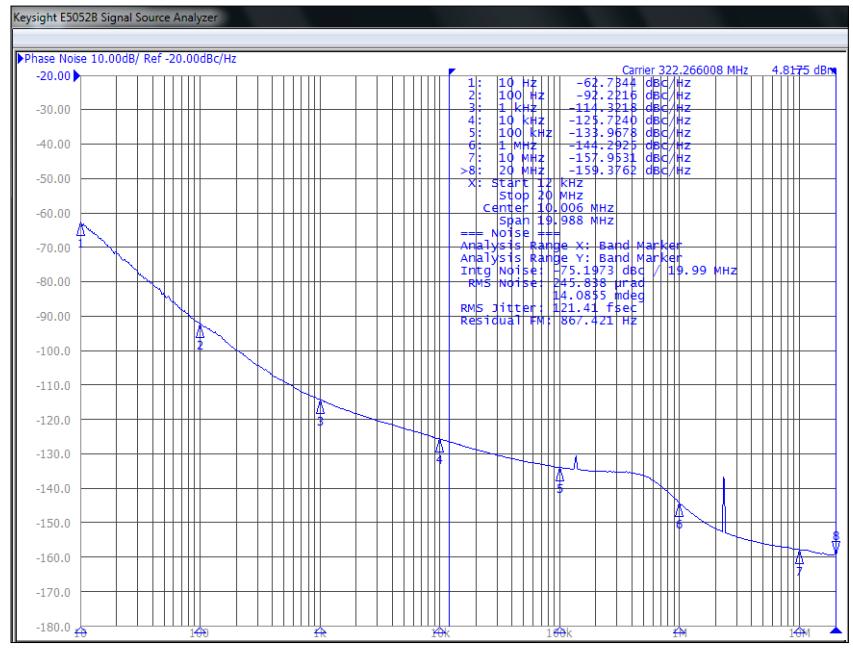
SELECTED PHASE NOISE PLOTS (@25°C ± 3°C)

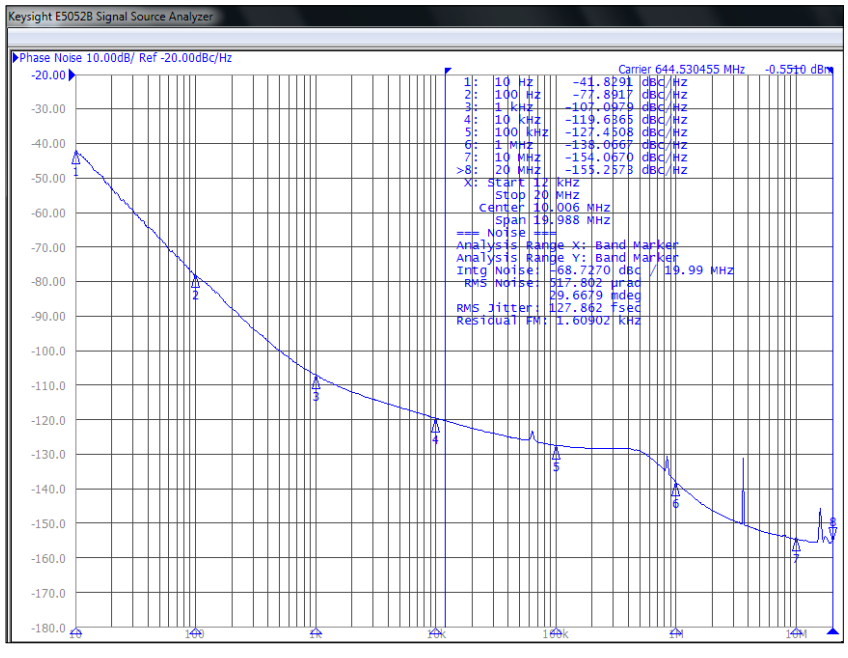
322.265625MHz | LVPECL | V_{DD}=3.3V



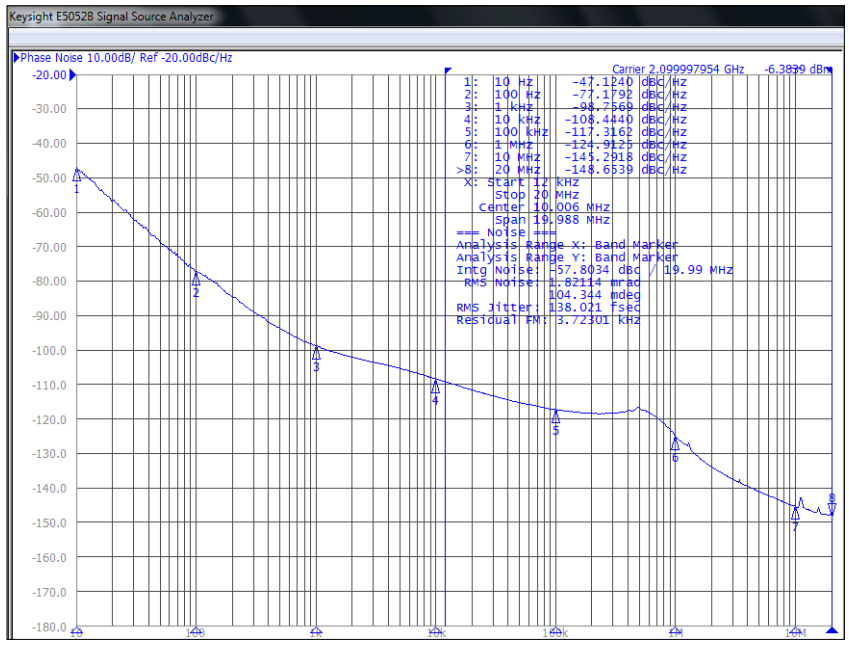
322.265625MHz | HCSL | V_{DD}=3.3V



644.53125MHZ | LVPECL | V_{DD}=3.3V



2100MHZ | LVPECL | V_{DD}=3.3V



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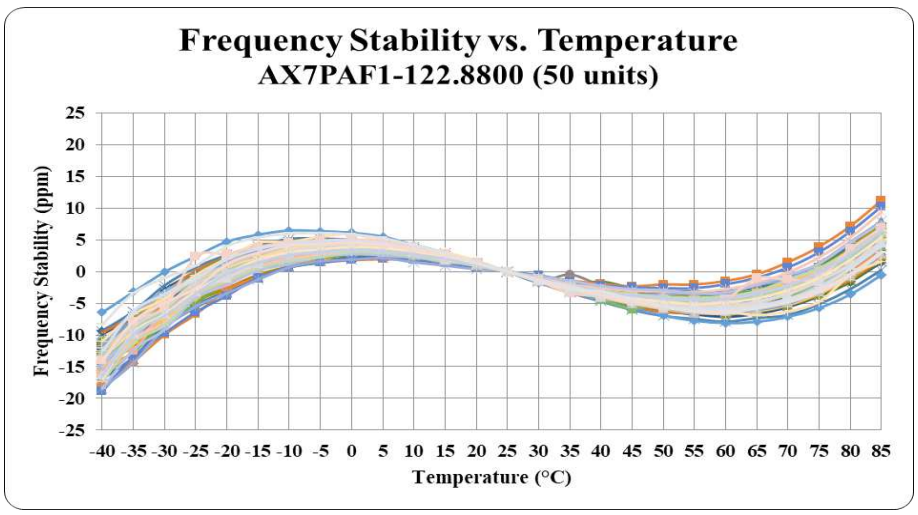
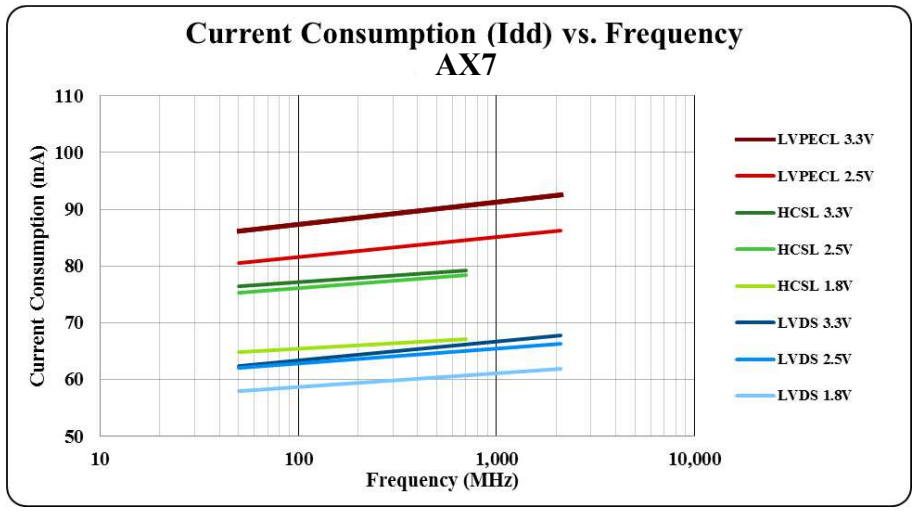
TYPICAL FREQUENCY Vs. TEMPERATURE CHARACTERISTICS

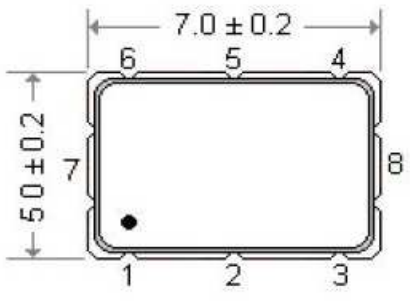


TYPICAL CURRENT CONSUMPTION (I_{DD}) Vs. FREQUENCY CHARACTERISTICS (@ 25ºC ± 3ºC)

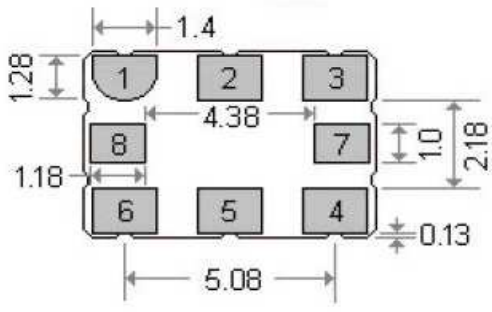


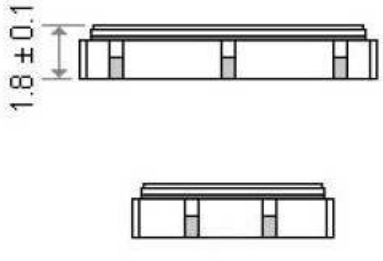
MECHANICAL DIMENSIONS

TOP VIEW

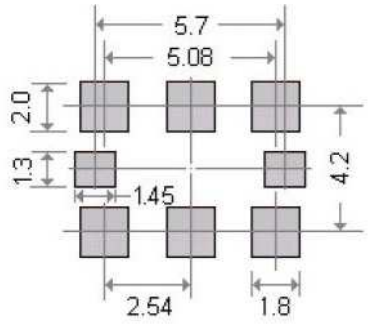


BOTTOM VIEW





RECOMMENDED LAND PATTERN



Dimensions: mm

PIN #	FUNCTION
# 1	**Option 1 & 2:** Output Enable/ Disable **Option 3 & 4:** No Connect
# 2	**Option 1 & 2:** No Connect **Option 3 & 4:** Output Enable/ Disable
# 3	GND
# 4	Output
# 5	Complementary output
# 6	Supply Voltage (V_{DD})
# 7	No connect
# 8	No connect

***Compatible with industry standard 5x7mm footprint. Pin 7 and 8 are no connect solder pads, not required.**

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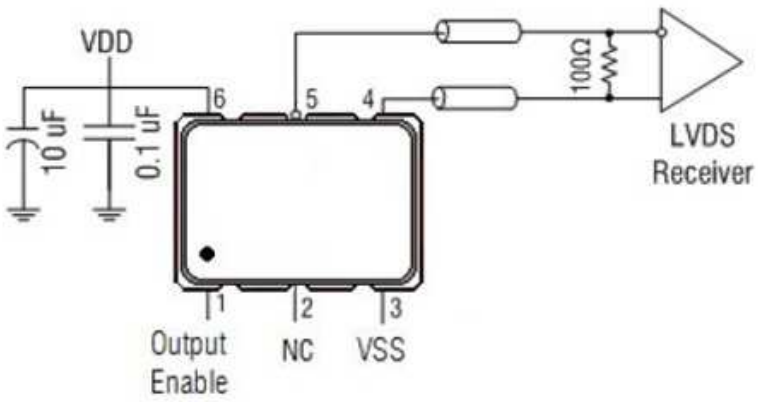
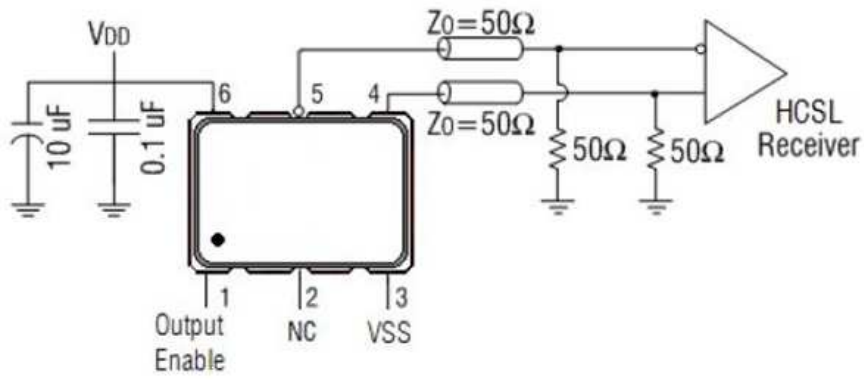
RECOMMENDED TEST CIRCUIT

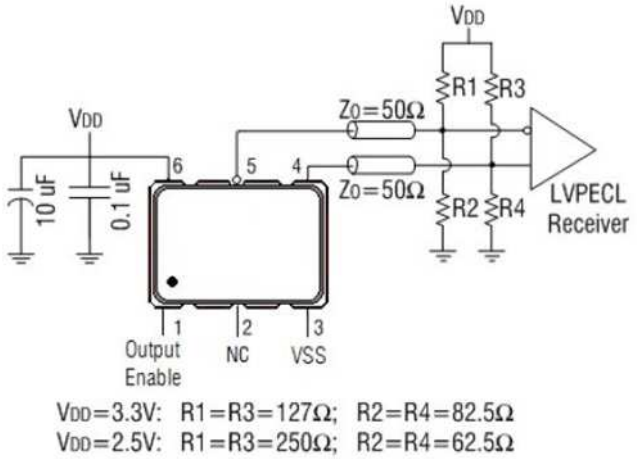
LVDS



HCSL

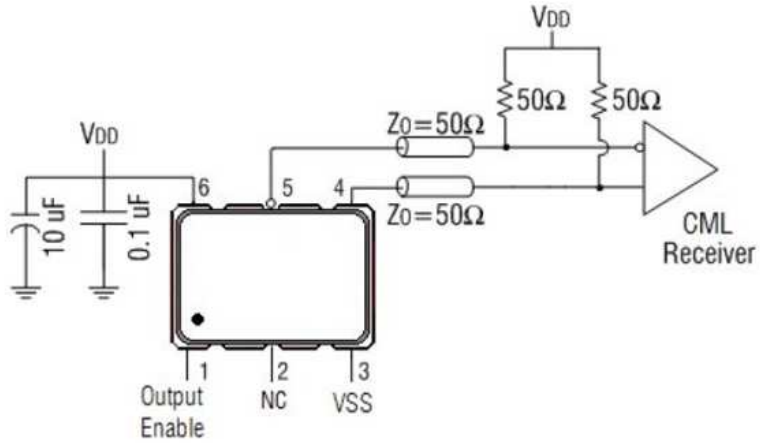


LVPECL

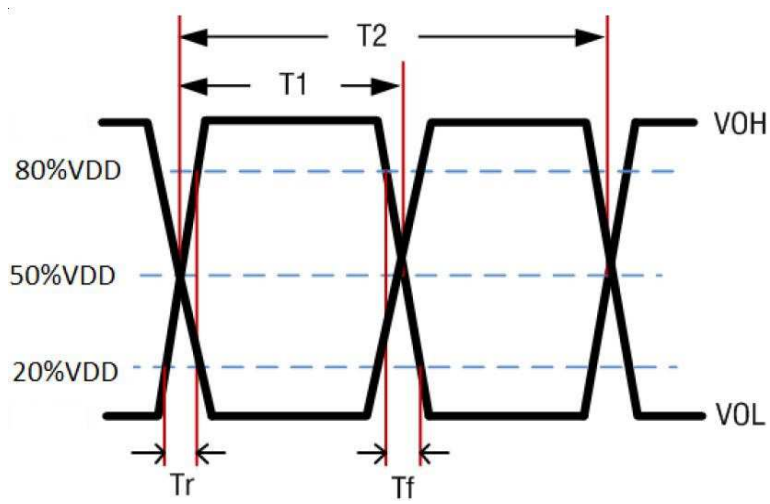


VDD=3.3V: R1=R3=127Ω; R2=R4=82.5Ω
VDD=2.5V: R1=R3=250Ω; R2=R4=62.5Ω

CML



DIFFERENTIAL OUTPUT WAVEFORM



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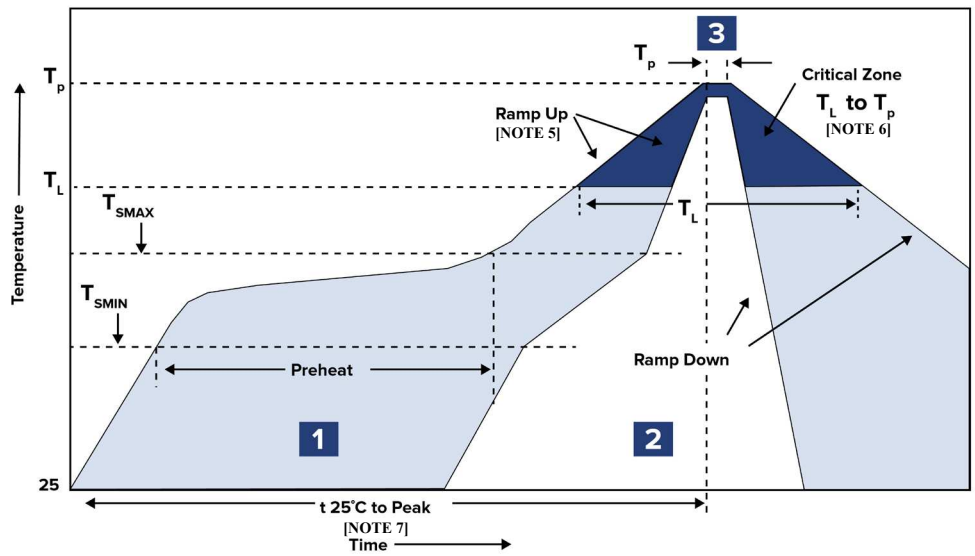
REFLOW PROFILE



ZONE	DESCRIPTION	TEMPERATURE	TIME
1	Preheat / Soak	T_{SMIN} ~ T_{SMAX} 150°C ~ 200°C	60 ~ 180 sec.
2	Reflow	T_L 217°C	60 ~ 150 sec.
3	Peak heat	T_P 260°C±5°C	20 ~ 40 sec.

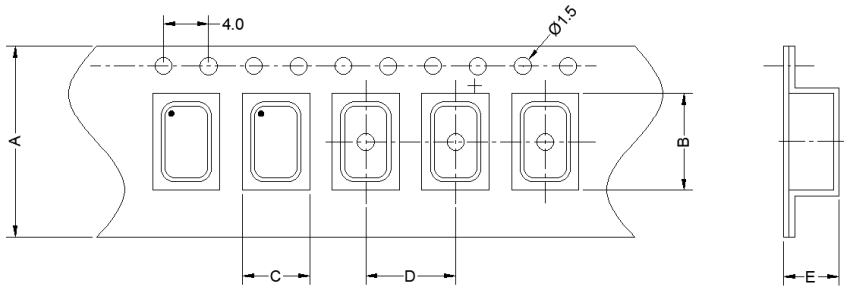
Note 5: Ramp Up Rate ($T_L \rightarrow T_P$) = 3°C / sec. MAX
Note 6: Ramp Down Rate ($T_P \rightarrow T_L$) = 6°C / sec. MAX
Note 7: Time 25°C to Peak Temperature (25°C → T_P) = 8 minutes MAX

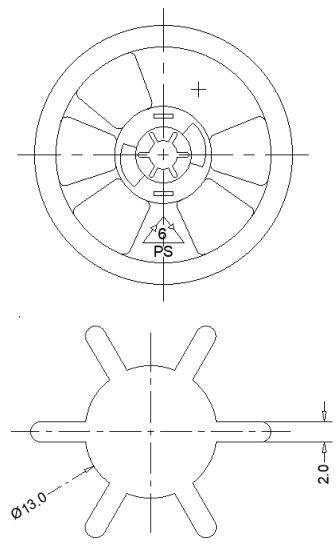
***Can withstand 2 times reflow**
***All temperatures refer to topside of the package, measured on the package body surface**

PACKAGING

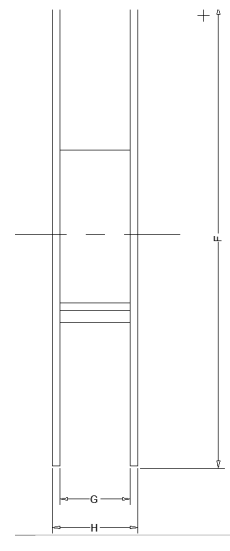
C = Cut Tape 50 units
T = Tape & Reel 250 units/reel

FEEDING (PULL) DIRECTION →





Tape Dimensions	
A	16.0
B	7.2
C	5.4
D	8.0
E	1.8
Reel Dimensions	
F	180.0
G	16.5
H	19.6



Dimensions: mm

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