Discontinued

This part is no longer available from Fox, please contact IDT for this product.

PCN452

An Integrated Device Technology, Inc. Company

Model: FXTC-HE73 Series

Preliminary

HCMOS 7 x 5mm 3.3V TCXO

Freq: 0.75 MHz to 250MHz

Need a Sample

Features

- EXTREMELY Low Jitter
- XPRESSO Delivery
- Frequency Resolution to six decimal places
- -40 to +85°C operating temperatures
- Tri-State Enable / Disable Feature
- Industry Standard Package, Footprint & Pin-Out
- Fully RoHS compliant
- Serial ID with Comprehensive Traceability

RoHS Compliant

Applications

- Medical Monitoring and Measurement
- Telecom and Networking
- Test and Measurement Detection, Sensing, and Metering
- Military Communications
- Signal Processing and Data acquisition.

Description

XPRESSO-TC is a breakthrough in configurable Frequency Control Solutions. XPRESSO-TC utilizes a family of proprietary ASICs, designed and developed by Fox, with a key focus on noise reduction technologies and tight temperature stability.

The 3rd order Delta Sigma Modulator reduces noise to the levels that are comparable to traditional Bulk Quartz and SAW oscillators.

With short lead-time, low cost, low noise, wide frequency range, and excellent temperature performance, XPRESSO-TC is an ideal choice over the conventional technologies.

Finished XPRESSO-TC parts are 100% final tested.

Contents

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Doc #100909

An Integrated Device Technology, Inc. Company

Model: FXTC-HE73 Series

Preliminary

Model Selection Guide & Fox Part Number

STEP #1: Customer selects the Model Description and provides to Fox Customer Service

Model Description

FXTC – H E 7 3 P R – 15.360 Frequency (in MHz)

Resolutions to 6 places past the decimal point

C = 0°C to +70°C
J = -30°C to +80°C
R = -40°C to +85°C

H = HCMOS
L = LVDS
M = **LVDS** ***(pin 2 E/D)***
X = HCMOS *(comp 2nd Output)*

E = Epoxy

7 = 7.0 x 5.0mm

3 = 3.3V
2 = 2.5V

L = **± 5 PPM Stability**
P = **± 2.5 PPM Stability**
S = ± 1.5 PPM Stability
T = ± 1 PPM Stability

*Not all stability and operating temps possible

STEP #2: The Fox Customer Service team provides a customer specific Part Number for use on their Bill Of Materials (BOM).

Fox Part Number *(The assigned Fox Part Number must be on the BOM – not the above Model Description)*
(This will ensure receipt of the proper part)

775 – 15.360 – 2

The 1st Field
Product Code #
775 = FXTC-HE73

The 2nd Field
The Customer's Frequency

The 3rd Field
Fox Internally Generated Number
(If any specification changes, the last digits change)
(The same specs for a different customer also changes the last digits)

This example, FXTC-HE73PR-15.360 = Temperature Compensated, HCMOS Output, Epoxy, 7 x 5mm Package, 3.3V, ±2.5 PPM Stability, -40 to +85°C Temperature Range, at 15.360 MHz

Absolute Maximum Ratings *(Useful life may be impaired. For user guidelines only, not tested)*

Parameters	Symbol	Condition	Maximum Value (unless otherwise noted)
Input Voltage	V_{DD}		–0.5V to +4.0V
Operating Temperature	T_{AMAX}		–55°C to +105°C
Storage Temperature	T_{STG}		–55°C to +125°C
Junction Temperature			125°C
ESD Sensitivity	HBM	Human Body Model	1 kV

Electrical Characteristics

Parameters	Symbol	Condition	Maximum Value (unless otherwise noted)
Frequency Range	Fo		0.75 to 250.000 MHz*
Initial Frequency Tolerance		Ta=25°C (after 2 reflows)	±2 PPM
Frequency Stability over Temp (ref 25C)		0°C to +70°C -30°C to +80°C -40°C to +85°C	±5, 2.5, 1.5, 1 PPM ±5, 2.5, 1.5 PPM ±5, 2.5 PPM
Frequency Stability Over Voltage Change		(VDD+-5%)	±0.5 PPM
Frequency Stability Over Load Change		(CL+-10%)	±0.2 PPM
Aging per Year			±1 PPM
Temperature Range	T_O T_{STG}	Standard operating Extended option Storage	0°C to +70°C -30°C to +80°C -40°C to +85°C -55°C to +125°C
Supply Voltage	V_{DD}	Standard	3.3 V ± 5%
Input Current	I_{DD}	15pF Load - All frequencies 0.75 ~ 20 MHz 20+ ~ 50 MHz 50+ ~ 130 MHz 130+ ~ 200 MHz 200+ ~ 250 MHz	 40 mA 43 mA 55 mA 63 mA 68 mA
Output Load	HCMOS	Standard *Optional To 125 MHz*	15 pF 30 pF
Start-Up Time	T_S		10 mS
Output Enable / Disable Time			100 nS

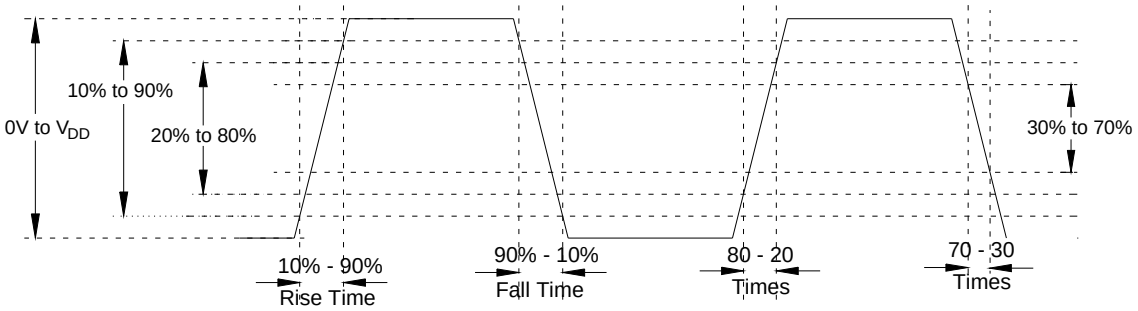
.
*Not all frequencies may be available.

Output Wave Characteristics

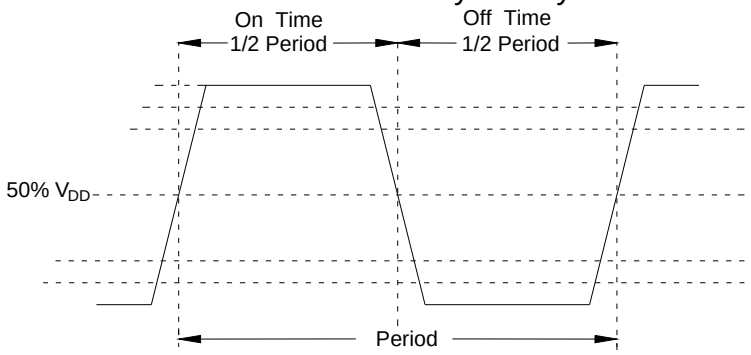
Parameters	Symbol	Condition	Maximum Value (unless otherwise noted)
Output LOW Voltage	V_{OL}	15pF Load - All frequencies 0.75 to 150 MHz 150+ to 250 MHz	 10% V_{DD} 20% V_{DD}
Output HIGH Voltage	V_{OH}	15pF Load - All frequencies 0.75 to 150 MHz 150+ to 250 MHz	 90% V_{DD} MIN 80% V_{DD} MIN
Output Symmetry (See Drawing Below)		15pF Load - All frequencies @ 50% V_{DD} Level	 45% ~ 55%
Output Enable (PIN # 2) Voltage	V_{IH}		≥ 70% V_{DD}
Output Disable (PIN # 2) Voltage	V_{IL}		≤ 30% V_{DD}
Cycle Rise Time (See Drawing Below)	T_R	15pF Load - All frequencies 0.75 to 150 MHz 150+ to 250 MHz	 3 nS (10%~90%) 3 nS (20%~80%)
Cycle Fall Time (See Drawing Below)	T_F	15pF Load - All frequencies 0.75 to 150 MHz 150+ to 250 MHz	 3 nS (90%~10%) 3 nS (80%~20%)

If 30% to 70% times are used, Rise and Fall times change to 1.5 nS from 0.75 to 250MHz
If 20% to 80% times are used, Rise and Fall times change to 2 nS from 0.75 to 150MHz

Rise Time / Fall Time Measurements

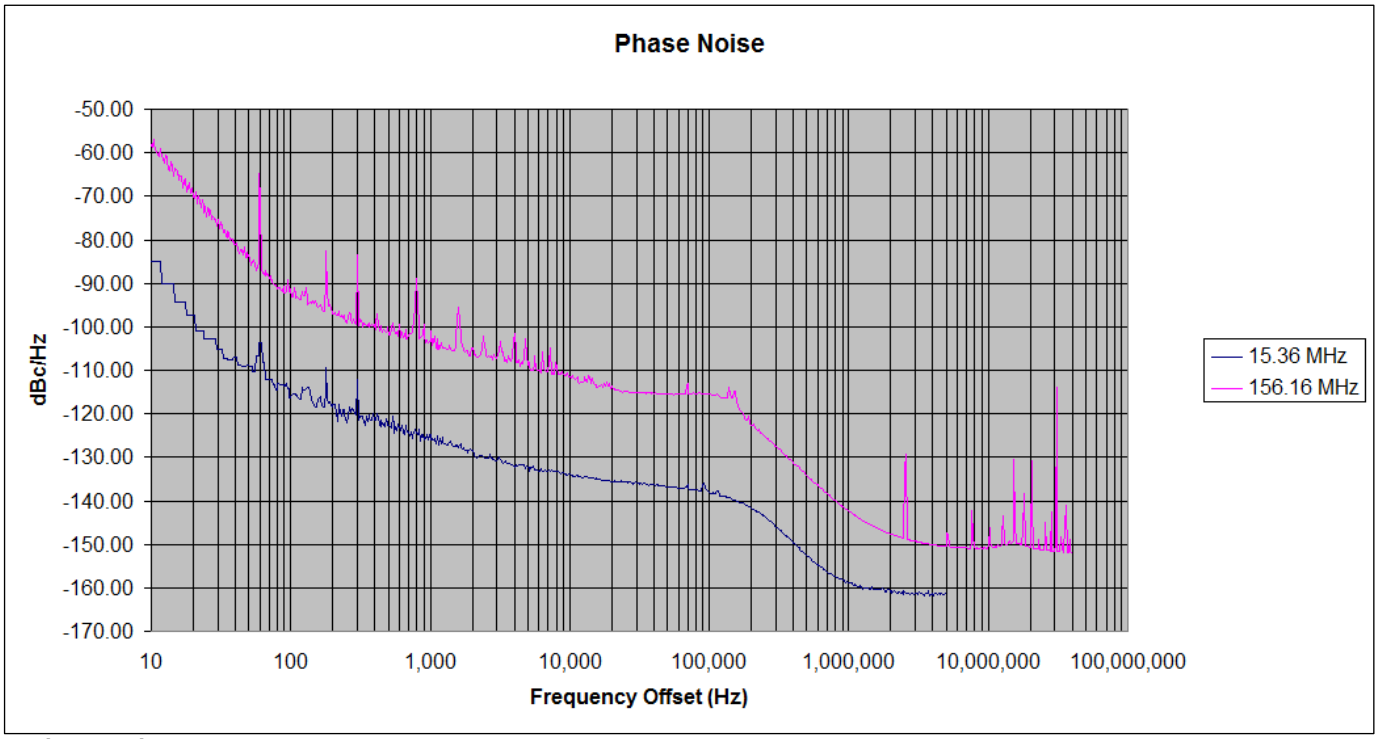


Oscillator Symmetry



Ideally, Symmetry should be 50/50 -- Other expressions are 45/55 or 55/45

Phase Noise



Phase Noise was measured on an Agilent 5052A Phase Noise Measurement System; measured directly into 50 ohm input; V_{DD} = 3.3V. 15.36MHz only to 5MHz offset due to Equipment Limitation.

Jitter is frequency dependent. Below are typical measured values at select frequencies.

Phase Jitter & Time Interval Error (TIE)

Frequency	Phase Jitter 12kHz to 20MHz (Fo = 156.16 MHz) 12kHz to 5MHz (Fo = 15.36 MHz)	T I E (Sigma of Jitter Distribution)	Units
15.36 MHz	0.94	3.5	pS RMS
156.16 MHz	1.10	3.9	pS RMS

Phase Jitter is integrated from Agilent 5052A Phase Noise Measurement System; measured directly into 50 ohm input; V_{DD} = 3.3V.
TIE was measured on LeCroy LC684 Digital Storage Scope, directly into 50 ohm input, with Amherst M1 software; V_{DD} = 3.3V.
*Per **MJSQ** spec (Methodologies for Jitter and Signal Quality specifications)*

Random & Deterministic Jitter Composition

Frequency	Random (Rj) (pS RMS)	Deterministic (Dj) (pS P-P)	Total Jitter (Tj) (14 x Rj) + Dj
15.36 MHz	1.68	8.7	32.7
156.16 MHz	1.47	10.3	31.3

Rj and Dj, measured on LeCroy LC684 Digital Storage Scope, directly into 50 ohm input, with Amherst M1 software.
*Per **MJSQ** spec (Methodologies for Jitter and Signal Quality specifications)*

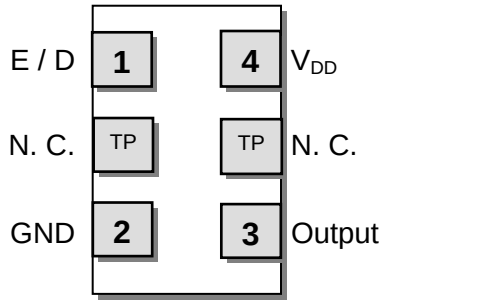
Pin Description and Recommended Circuit

Pin #	Name	Type	Function
1	E / D [1]	Control	Enable / Disable Control of Output (0 = Disabled)
2	GND	Ground	Electrical Ground for V_{DD}
3	Output	Output	HCMOS Oscillator Output
4	V_{DD} [2]	Power	Power Supply Source Voltage

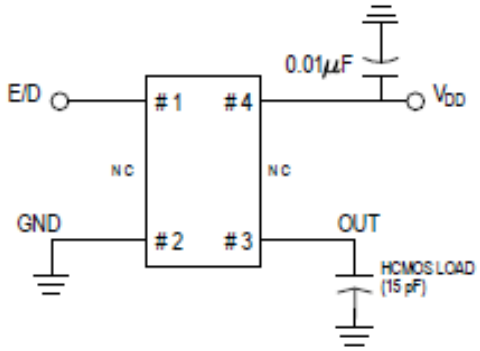
NOTES:

[1] Includes pull-up resistor to V_{DD} to provide output when the pin (1) is No Connect.

[2] Installation should include a 0.01µF bypass capacitor placed between V_{DD} (Pin 4) and GND (Pin 2) to minimize power supply line noise.



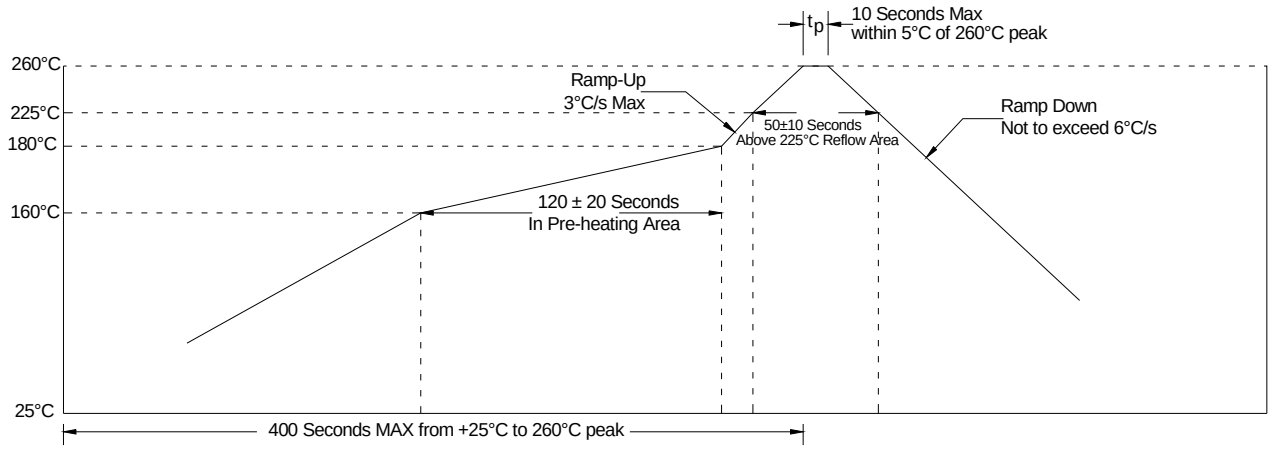
Terminations as viewed from the Top



Enable / Disable Control

	Pin # 1 (state)	Output (Pin # 3)
	OPEN (No Connection)	ACTIVE Output
	"1" Level $V_{IH} \geq 70\%\ V_{DD}$	ACTIVE Output
	"0" Level $V_{IL} \leq 30\%\ V_{DD}$	High Impedance

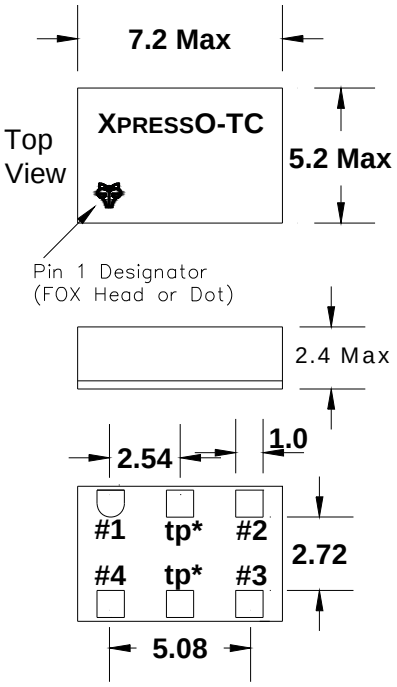
Soldering Reflow Profile (2 times Maximum at 260°C for 10 seconds MAX)

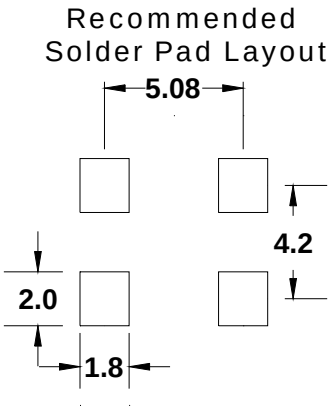


Mechanical Dimensional Drawing & Pad Layout

Actual part marking is depicted.

See **Traceability** *(pg. 9)* for more information





Note: XPRESSO HCMOS TCXOs are designed to fit on industry standard, 4 pad, layouts

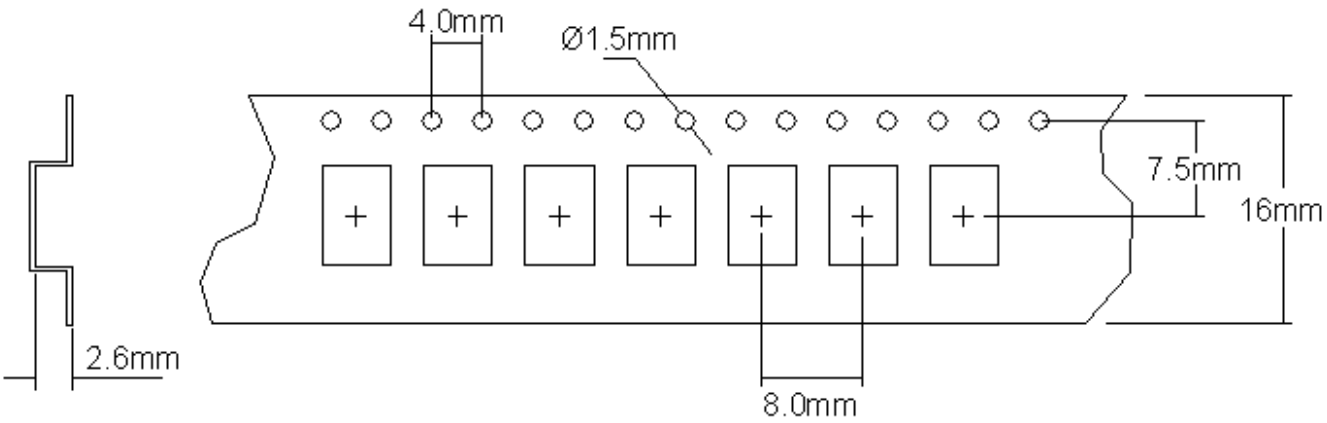
Pin Connections

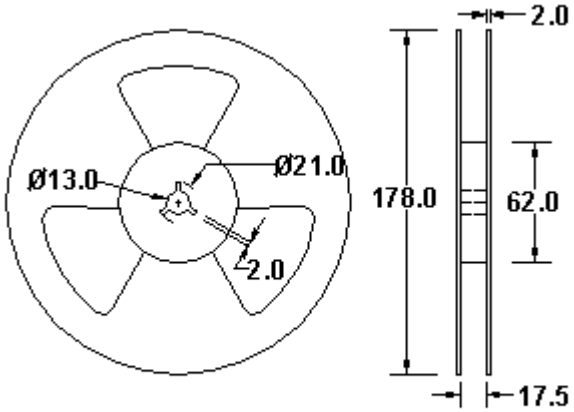
#1) OE	**#3 Output**
#2) GND	**#4 VDD**

*** tp = test points and are no connect.**

Drawing is for reference to critical specifications defined by size measurements.
Certain non-critical visual attributes, such as side castellations, reference pin shape, etc. may vary

Tape and Reel Dimensions (mm)

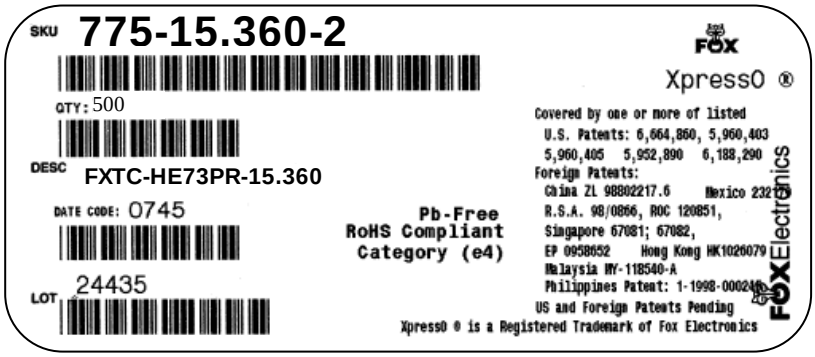




Std. reel qtty. - 500 pcs.

Labeling (Reels and smaller packaging are labeled with the below) [Subject to Review]

- Fox Part Number: 775-**15.36-2**
- Quantity: 500 pieces
- Description: **FXTC-HE73PR-15.360**
- Date Code **0745**
  (YYWW 2007 45th wk)
- LOT # **24435**



Traceability – LOT Number & Serial Identification

LOT Number

The LOT Number has direct ties to the customer purchase order. The LOT Number is marked on the "Reel" label, and also stored internally on non-volatile memory inside the XPRESSO-TC part. XPRESSO-TC parts that are shipped Tape and Reel, are also placed in an Electro Static Discharge (ESD) bag and will have the LOT Number labeled on the exterior of the ESD bag.

It is recommended that the XPRESSO-TC parts remain in this ESD bag during storage for protection and identification.

If the parts become separated from the label showing the LOT Number, it can be retrieved from inside one of the parts, and the information that can be obtained is listed below:

- Customer Purchase Order Number
- Internal Fox Sales Order Number
- Dates that the XPRESSO-TC part was shipped from the factory
- The assigned customer part number
- The specification that the part was designed for

Serial Identification

The Serial ID is the individualized information about the configuration of that particular XpressO-TC part. The Serial ID is unique for each and every XPRESSO-TC -TC part, and can be read by special Fox equipment.

With the Serial ID, the below information can be obtained about that individual, XPRESSO-TC part:

- Equipment that the XPRESSO-TC part was configured on
- Raw material used to configure the XPRESSO-TC part
- Traceability of the raw material back to the foundries manufacturing lot
- Date and Time that the part was configured
- Any optimized electrical parameters based on customer specifications
- Electrical testing of the actual completed part
- Human resource that was monitoring the configuration of the part

Fox has equipment placed at key Fox locations World Wide to read the Lot Identification and Serial Number of any XPRESSO-TC part produced and can then obtain the information from above within 24 hour

Environmental Testing

Parameter	Test Method
Mechanical Shock	MIL-STD-202, Method 213 Half sine wave (Figure 213-1) Test condition C (100g, 6mS)
Mechanical Vibration	MIL-STD-202, Method 204 Freq.range: 10~2000Hz Peak to peak amplitude:1.52mm. Peak acceleration:5G (49m/s2) 3 direction(X, Y,Z),each 20min,Total 12cycles
High Temperature Burn-in	Under Power @ 125°C for 2000 Hours
Temperature Cycle	Power off -55°C ~ +125°C 15 minutes each temp 100 cycles
Humidity	MIL-STD-202, Method 103B, Test condition B. Power off Relative Humidity = 90 to 95%. Ta = 40C. Duration = 96 hours.

Notes:

Patent Numbers:
US 6,664,860, US 5,960,403, US 5,952,890; US 5,960,405; US 6,188,290; Foreign Patents: R.S.A. 98/0866, R.O.C. 120851; Singapore 67081, 67082; EP 0958652
China ZL 98802217.6, Malaysia MY-118540-A, Philippines 1-1998-000245, Hong Kong #HK1026079, Mexico #232179
US and Foreign Patents Pending
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