

DESCRIPTION

Digitally tunable UHF notch filter with SPI control, ideal for interference mitigation in SDR and comm systems.

FEATURES

Lumped Element Design

The 5723 Tunable Notch Filter uses lumped element components for compact size and high performance.

Constant Absolute Bandwidth

The design maintains a consistent notch bandwidth across the 486–750 MHz frequency range while the passband extends down to 225MHz.

Programmable Operation Modes

The notch filter supports active (notch enabled) and bypass (notch disabled) modes via SPI control.

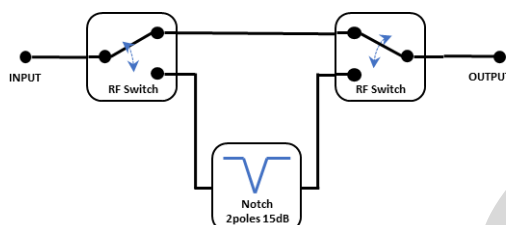
Temperature-Compensated Performance

Internal temperature compensation keeps the notch center stable, with >15 dB rejection maintained over -40 °C to +85 °C.

Applications

- Military communications
- Software-defined radios (SDR)
- EW/EMI mitigation
- Field-deployable RF systems
- Test & Measurement

Block Diagram

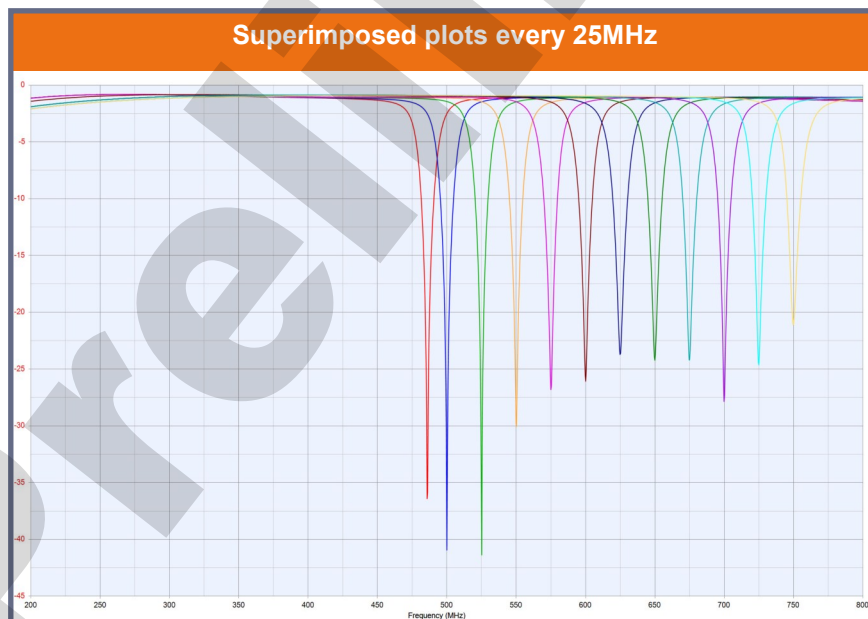
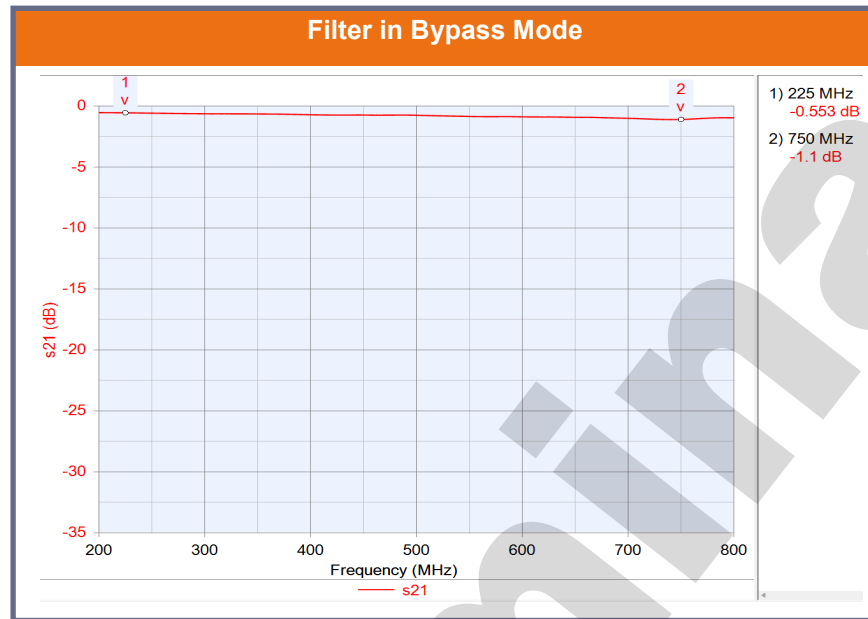


Specifications

Frequency Range	
Passband Frequency Range	225 to 750MHz
Tunable Notch Frequency Range (f_{notch})	486 to 750MHz
Tuning Resolution	200 kHz
Performance	
Notch Rejection at $f_{\text{notch}} \pm 2\text{MHz}$	17dB typical, 15dB min
Passband Insertion Loss (Bypass Mode)	0.7dB typical
Passband Insertion Loss outside $f_{\text{notch}} \pm 24\text{MHz}$	1.2dB typical
Insertion Loss at $f_{\text{notch}} \pm 14\text{MHz}$	3.2dB typical, 3.8dB max
Impedance (Input/Output)	50 Ω
VSWR	2.5:1
Switching Speed, 90% RF Power (typical)	< 50 μsec
Power & Control	
RF Power Handling	+33dBm
IIP3	TBD
DC Power	
DC Voltage	3.3 VDC $\pm$ 0.3 VDC
DC Current Max	45mA
Control Interface	SPI Serial Input
Environmental & Mechanical	
Temperature Range	-40°C to +85°C
Dimensions (inches)	1.50 X 1.10 X 0.25
Dimensions (mm)	38.10 X 27.94 X 6.35

Note: Parameters subject to change

Typical Responses



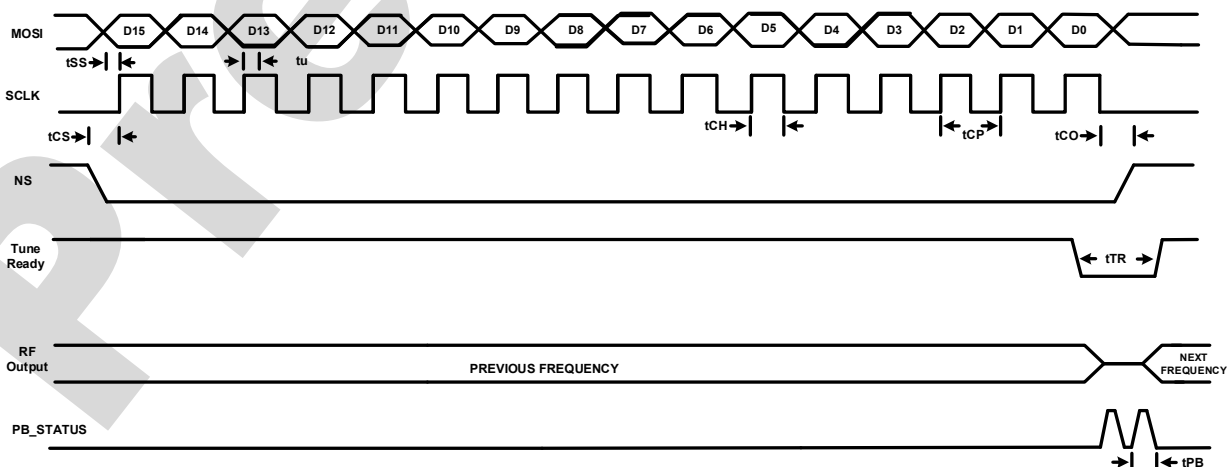
Notch Serial Address Input Timing Diagram

When the SPI_NS line is shifted low, the Tune_Ready line be at a high logic state to indicate the unit is ready to accept the tune word. Tuning of the filter starts when the last data clock (16th) pulse of the address is sent to the unit while the SPI_NS (Notch Select) is low. When the filter tuning is complete the Tune_Ready line will go high to indicate the filter tuning is complete. Reset the SPI_NS line high after sending the 16th clock bit to allow the unit to reset after the filter tuning is complete.

The PB_STATUS line indicates when the filter output is disrupted by the RF Bypass switches changing state. The PB_STATUS line will go to a High logic state whenever the bypass switches change state.

Symbol	Parameter	Min	Max	Units
tSS	Setup time MOSI Data to SPICLK	50		ns
tu	Hold Time MOSI Data From SPICLK		0	ns
tCH	Clock High Time	50		ns
tCL	Clock Low Time	50		ns
tCP	Clock Period	100		ns
tCS	Chip Setup Time (CS falling edge to SPICLK start)	100		ns
tCO	Chip Setup Time (CS rising edge to SPICLK end)	100		ns
tTR	Tune_Ready indicator		50	us
tACC	Access time from Last (16th) SPICLK edge to Fo		50	us
tPB	Passband Status Line Disruption at any Notch tune or Bypass Mode change instance		2.6	us

5723 ADDRESS PROTOCOL



Symbol	Parameter	Conditions	Min	Typ	Max	Units
FMAX	Maximum Serial Input Frequency		-		10	MHz
VIH	HIGH - level input voltage	VCC = 3.0 V to 3.6 V	1.7		VCC - 0.3	V
VIL	LOW- Level input voltage	VCC = 3.0 V to 3.6 V	-0.3		0.8	V
VOH	HIGH - level output voltage	VCC = 3.0 V to 3.6 V	2.4	3.0		V
VOL	LOW - level output voltage	VCC = 3.0 V to 3.6 V	-		0.45	V

Address Control Table

Notch Selection			Address Selection												
D15 MSB	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0 LSB
BP*	0**	0**	Filter Tune Address***												X

X= Don't Care (bit internally set at zero)

* 0 = Notch function Active, 1 = Notch function Bypass

** Set D14 and D13 to zero except when addressing Unit ID, Firmware Revision, or Production Date Code

*** Refer to Address Table for selected notch start and end addresses.

Address Table

Notch Start Address	Notch End Address	Frequency Range
4860	7500	486.0 - 750.0MHz *

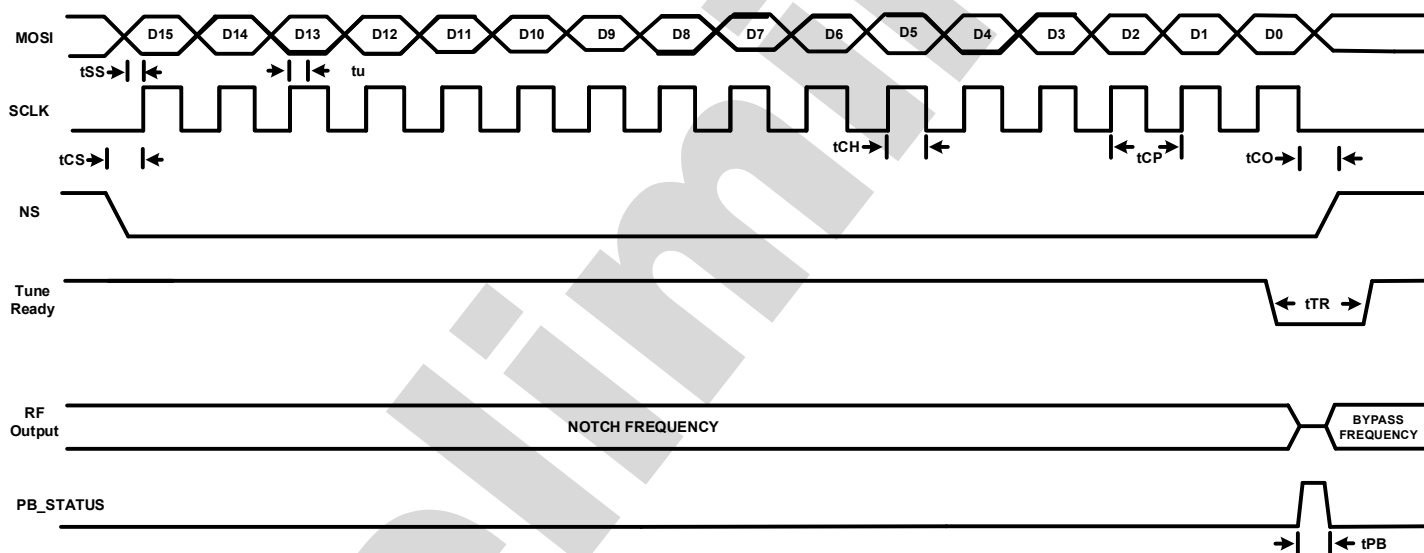
* If address sent outside the frequency range, the filter remains in previous state

Notch Bypass Enable

When D15 is set to logic "1" in the notch tune word, the notch filter will be set to Bypass mode on. In this state the notch will be bypassed.

The PB_STATUS line will go to a high state to indicate the RF line is disrupted. During this time the RF output will be low as the RF switches change state. After the RF switches have changed state, the PB_STATUS line will go low to indicate the RF line is enabled and the RF input of the notch is at the RF output.

5723 ADDRESS BYPASS ENABLE PROTOCOL

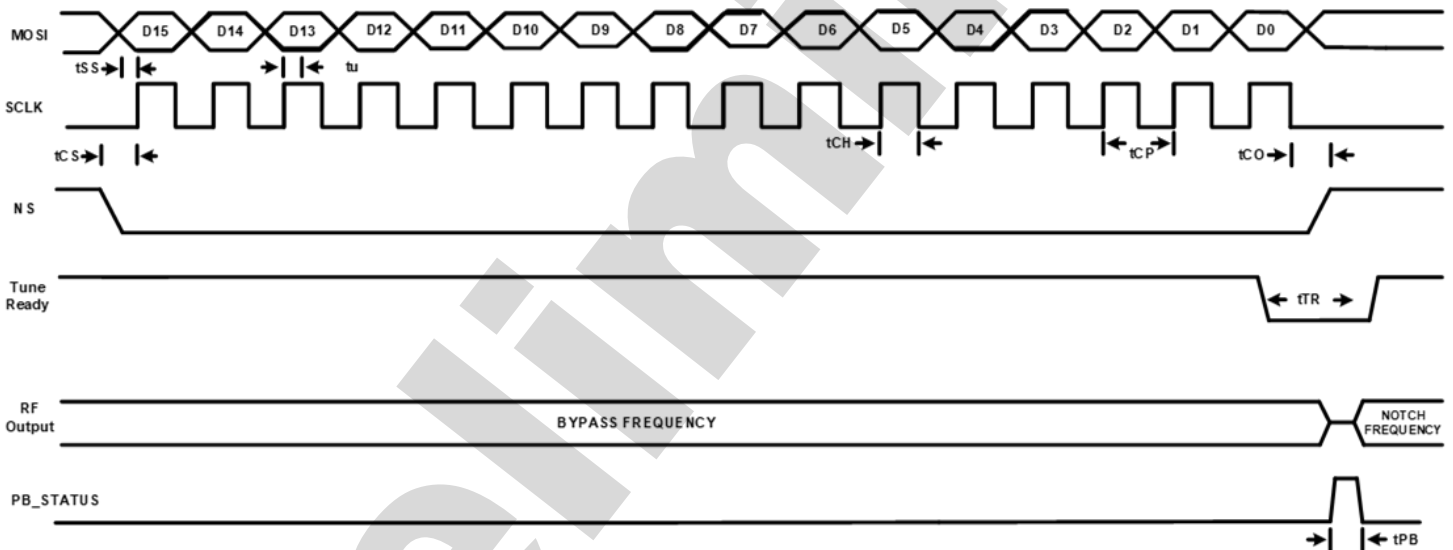


Notch Bypass Disable

When D15 is set to logic “0” in the notch tune word, the notch filter will be set to Bypass mode off. In this state the notch will be enabled.

The PB_STATUS line will go to a high state to indicate the RF line is disrupted. During this time the RF output will be low as the RF switches change state. After the RF switches have changed state, the PB_STATUS line will go low to indicate the RF line is enabled and the notch will be enabled.

5723 ADDRESS BYPASS DISABLE PROTOCOL

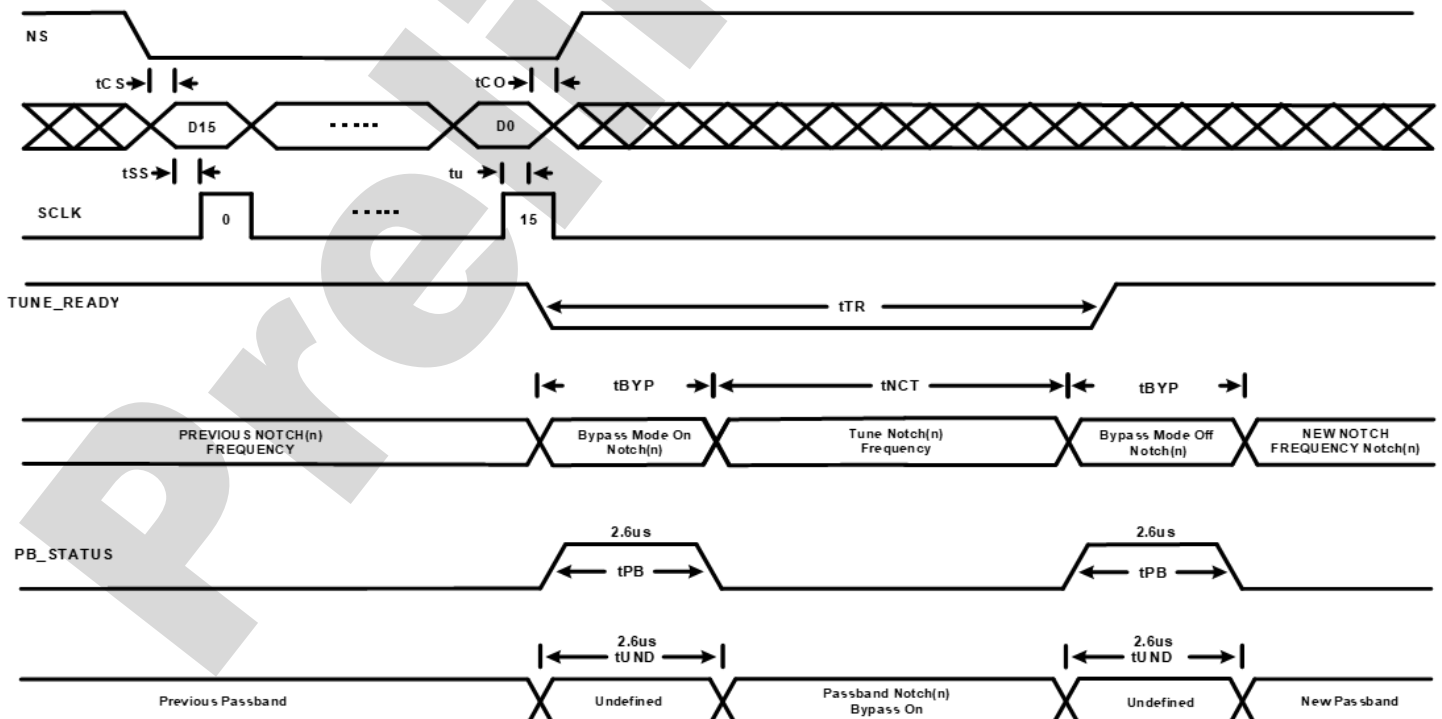


Notch Hot Switching

Hot Switching is allowed when the unit is tuning. It is not required to have the RF input turned off while the unit is tuning. When the unit is tuning, the RF Passband will go in to the Bypass Mode during tuning with the following Steps:

- Unit will go into Bypass mode and the Tune_Ready line will go to a low state.
- The Passband will be in an undefined state (tUND) for up to 2.6us in which time NO RF signal will pass through the unit.
- The Passband will return after tUND is complete and the unit will be in RF bypass mode.
- The Unit will tune the notch to the new notch frequency (tNCT) for up to 40us while in bypass mode.
- Once the notch tuning is complete the unit will turn off the RF bypass switch.
- The Tune_Ready ;line will go to a High logic state to show the unit has processed the tune word and is returning to the RF Bypass mode off.
- The Passband will be in an undefined state (tUND) for up to 2.6us in which time NO RF signal will pass through the unit.
- The Passband will return after tUND and will be set at the new notch(n) frequency and the RF Passband will be active.

5723 Hot Switching Notch



Note: This hot switching timing diagram also applies during temperature compensation, whenever the unit temperature changes by more than 2.5°C

NS = Notch Select Line

Device Commands and Addressing

The 5723 is designed to interface directly to the Serial Peripheral Interface (SPI) interface. The instructions and Addressing are listed in the table below. All instructions, addresses, and data are transferred with the MSB first and start with a High to Low transition if the SPI_NS line. Send the READ UNIT ID, READ UNIT FW CODE, and READ UNIT PRODUCTION DATE through Notch Channel 1 SPI address lines.

Instruction Name	Instruction Format	Operates On	Operation Description
Normal operation Bypass off	0000 1000 0000 0000 -		
READ UNIT ID	1011 1000 0000 0000	Unit ID Register	Read 4-digit Unit ID code (ASCII)
READ UNIT FW CODE	1101 1100 0000 0000	Unit FW Register	Read FW code 4-letter code (ASCII)
READ UNIT PRODUCTION DATE	1111 1110 0000 0000	Unit Date Register	Read 4-digit Unit Date Code (ASCII)

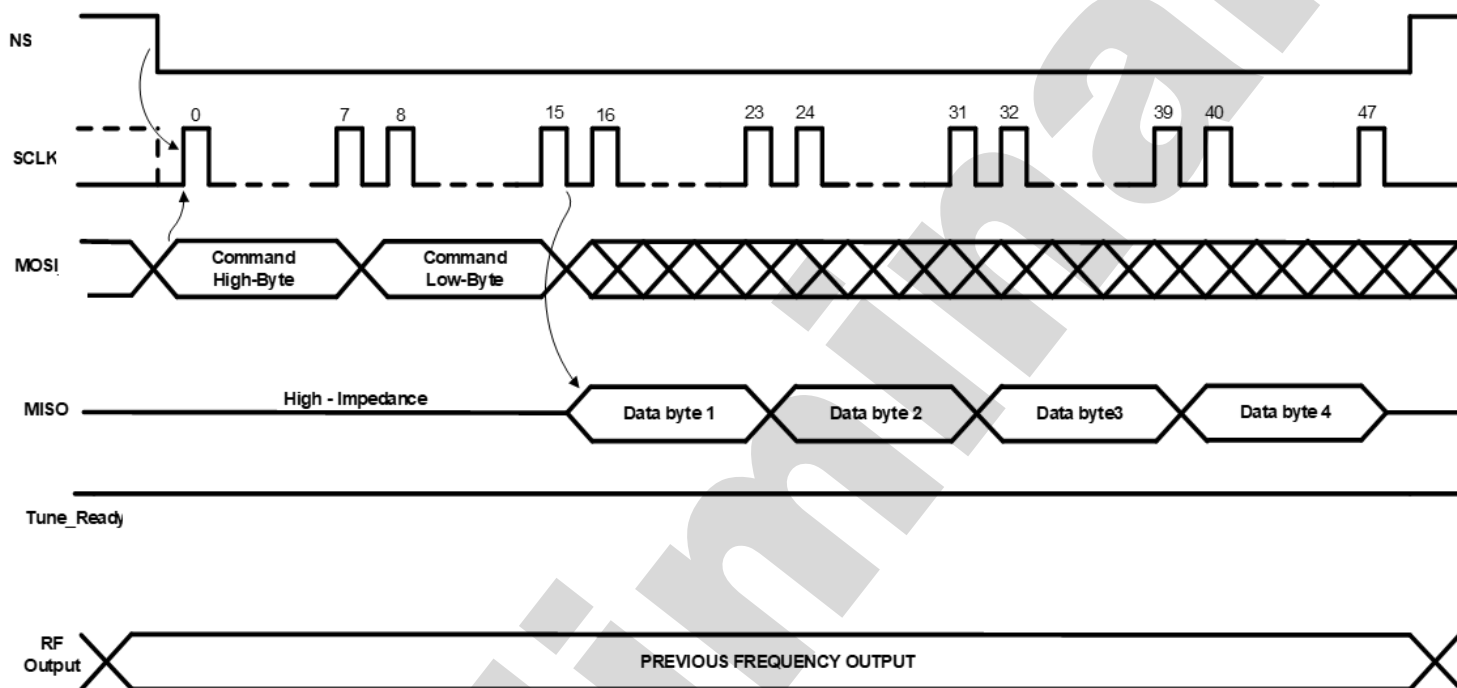
READ UNIT ID: The 5723 Notch Filter will send a 4-digit ID "5723" in ASCII code when the command is sent to the unit. The unit will stay at the last Notch frequency when the command is sent.

READ UNIT FW CODE: The 5723 Notch Filter will send a 4-digit Firmware ID in ASCII code when the command is sent to the unit. The unit will stay at the last Notch frequency when the command is sent.

READ UNIT PRODUCTION DATE: The 5723 Notch Filter will send a 4-digit date in MMY format in ASCII code when the command is sent to the unit. The unit will stay at the last Notch frequency when the command is sent.

Device Command Timing

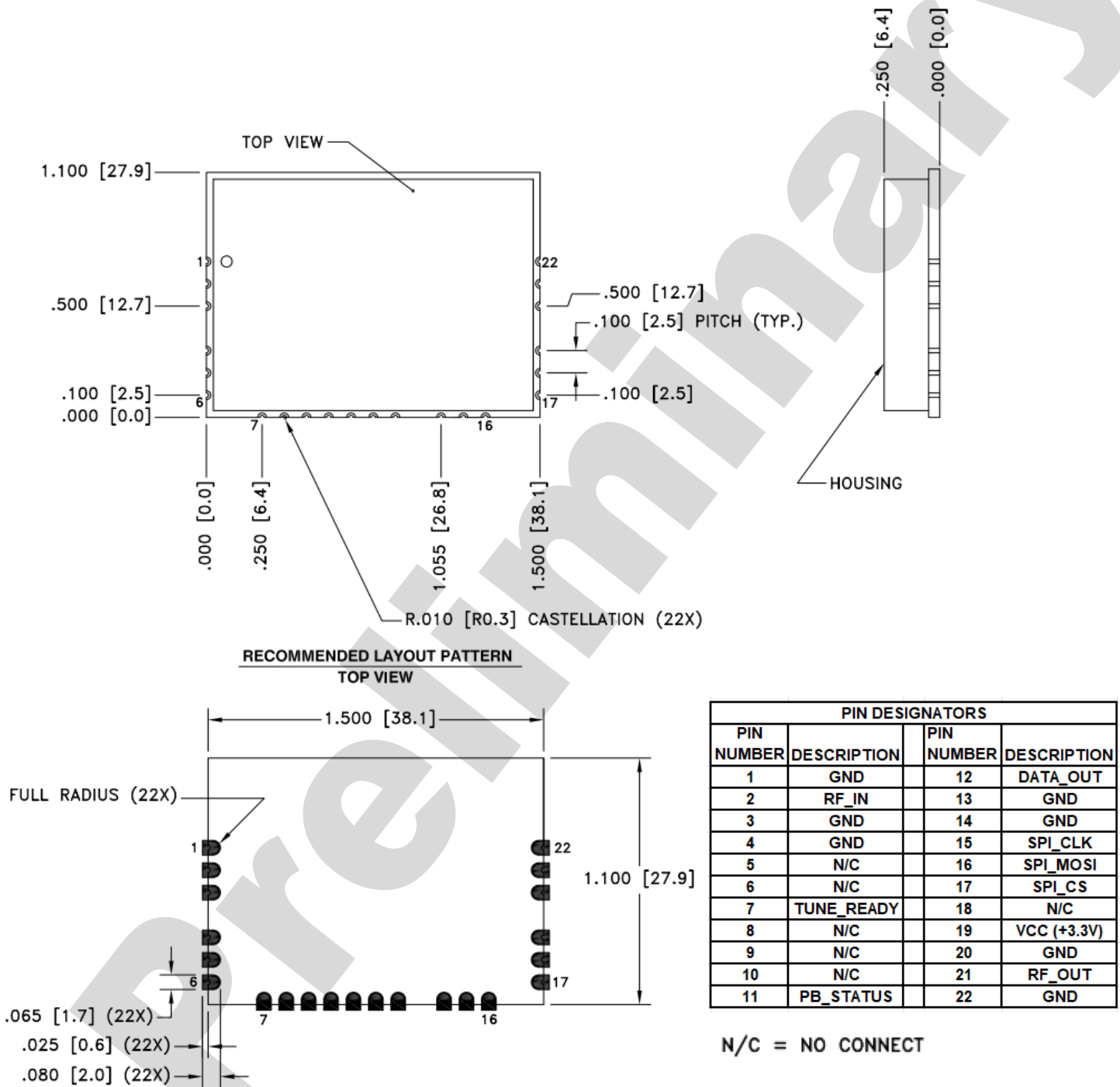
5723 READ UNIT COMMAND TIMING



The Read Unit Command Timing applies to the following commands:

- Read Unit ID
- Read Unit FW Code
- Read Unit Production Date

Mechanical



Environmental Specification Standards

Lead Plating:

- ELECTROLESS NICKEL, TYPE 1, CLASS 1, Cu/Ni P7, 100 MICRO INCHES (0.0001 INCHES) MINIMUM, IMMERSION GOLD PLATE 2 TO 6 MICRO INCHES (0.000002 TO 0.000006 INCHES) ON OUTER LAYERS.

Temperature:

- High temperature shall meet MIL-STD-810E, Method 501.3, Procedure I to 85°C storage, and procedure II to 85°C operating.
- Low temperature shall meet Method 502.3, Procedure I to -57°C storage, and Procedure II to -40°C operating.

Vibration:

- MIL-STD-810E Method 514.4 Ground Mobile Test Procedure I, Test Condition I - 3.4.7

Shock:

- MIL-STD-810E Procedure I, Method 516.4 - Functional Shock.

Reflow:

- TBD

Cleaning:

- Recommend cleaning solvents used which meet ODC (Ozone Depleting Chemical) requirements.
- Solvents containing methylene chloride or other epoxy solvents should be avoided since these will attack the epoxy encapsulation material of some components.
- Ultrasonic cleaning not recommended.

Moisture Sensitivity Level:

- MSL 3



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