TDS-5

CTCSS Decoder To 6 Line Binary Output

Manual Revision: 2019-06-08

Covers Firmware:
v1.0

Covers Hardware Revisions:
6000-A-1

SPECIFICATIONS

Operating Voltage	6 - 15 VDC
Operating Current	20 mA
Operating Temperature	-30 to +60°C
Input Level	25 - 500 mV RMS
Input Impedance	100K Ω
Frequency Range	12-270 Hz
Band Width for CTCSS	± 1.5%
Sync Tone Output	100 mA
Outputs 1 to 6	100 mA
CTCSS Output Codes	0-38
Dimensions	1.37" L x .83" W x .15" H

GENERAL INFORMATION

The TDS-5 decodes the 38 standard CTCSS tones qualified by a COR input and will represent the CTCSS code in a binary output. The Sync Tone Output can be used to gate the valid CTCSS tone for latching the binary output into other steering equipment. An input point for accepting a reference voltage to make it easier for the binary translation is provided.

HARDWARE INSTALLATION

Be certain to follow standard anti-static procedures when handling any of Midian's products.

P1 Connector

P1-4 – Black – Ground – Connect to the nearest ground point.

P1-2 – Red - +6 VDC to +15 VDC – Connect to switched B+ in the radio.

P1-3 – Brown – COR Input – Connect to point in the squelch or CTCSS circuit that changes logic level when carrier is received. **Note:** The TDS-5 will not decode unless COR is present.

P1-1 – Green – RX Tone Input – Connect to an audio point in the receiver, usually the high side of the volume control or discriminator audio. The audio point **MUST** be before any kind of sub-audible filtering circuits.

P1-5 – Blue – Tone Sync Output – An output that can be used to gate the binary data that appears on the open collector outputs.

P1-6 – Orange – Binary Out 1 – Bit 0 of the binary open collector outputs.

P1-7 – Yellow – Binary Out 2 – Bit 1 of the binary open collector outputs.

P1-8 – White/Green – Binary Out 3 – Bit 2 of the binary open collector outputs.

P1-9 – White – Binary Out 4 – Bit 3 of the binary open collector outputs.

P1-10 – White/Gray – Binary Out 5 – Bit 4 of the binary open collector outputs.

P1-11 – Gray – Binary Out 6 – Bit 5 of the binary open collector outputs.

P1-12 – White/Orange – Not Used.

P1-13 – Gray – Not Used.

Miscellaneous Board Connections

IO1 – Not Used.

OCB+ - This input point on the board will allow for a reference voltage to be applied to all open collector outputs being pulled up by 47K Ohms for easier interfacing of external logic devices.

P3 – Factory Use Only.

P4 – Not Used.

Solder Jumpers

SJ1 – SYNC POLARITY – Solder Jumper Installed = Tone Sync Output is Active Low. Solder Jumper Not Installed (Default) = Tone Sync Output is Active High.

SJ2 – **COR POLARITY** – Solder Jumper Installed = COR Input is Active High. Solder Jumper Not Installed (Default) = COR Input is Active Low.

SJ3 – **BINARY OUTPUT POLARITY** – Solder Jumper Installed = Binary Output Inverted. Solder Jumper Not Installed (Default) = Binary Output Normal.

SJ4 – NOT USED.

SJ5 – NOT USED.

SJ6 – NOT USED.

CTCSS Frequency to Binary Output Code Conversion Chart

Frequency in Hz.	Decimal Value	Binary Output Normal	Binary Output Inverted
0 or Invalid Code	0	000000	111111
67.0	1	000001	111110
71.9	2	000010	111101
74.4	3	000011	111100
77.0	4	000100	111011
79.7	5	000101	111010
82.5	6	000110	111001
85.4	7	000111	111000
88.5	8	001000	110111
91.5	9	001001	110110
94.8	10	001010	110101
97.4	11	001011	110100
100.0	12	001100	110011
103.5	13	001101	110010
107.2	14	001110	110001
110.9	15	001111	110000
114.8	16	010000	101111
118.8	17	010001	101110
123.0	18	010010	101101
127.3	19	010011	101100
131.8	20	010100	101011
136.5	21	010101	101010
141.3	22	010110	101001
146.2	23	010111	101000
151.4	24	011000	100111
156.7	25	011001	100110
162.2	26	011010	100101
167.9	27	011011	100100
173.8	28	011100	100011
179.9	29	011101	100010
186.2	30	011110	100001
192.8	31	011111	100000
203.5	32	100000	011111
210.7	33	100001	011110
218.1	34	100010	011101
225.7	35	100011	011100
233.6	36	100100	011011
241.8	37	100101	011010
250.3	38	100110	011001

HARDWARE ALIGNMENT

RX Audio Input: Apply the desired CTCSS tone at 1 KHz of modulation from a signal generator to the receiver. For best SINAD performance, adjust RP1 so that on TP1 there is approximately 1.8 Vpp. TP2 should show a continuous clean and symmetrical square wave.

RADIO PROGRAMMING

The TDS-5 is a generic module that wire into most radios. Any radio specific programming, if available, would be found on any Application Notes available for those radios. You may visit our website or call us for application notes.

OPERATION

Decode: When the COR input is not active, the Tone Sync Output and the binary outputs will remain in a non-active state. When the COR input goes active, the TDS-5 will start looking at the incoming audio and make the determination if the CTCSS audio matches any of the codes in the chart. If a code does match after the appropriate number of samples needed to validate the tone, the TDS-5 will set the binary outputs to represent the code that was decoded and later will pulse an active state on the Tone Sync output to reflect the binary outputs state change.

Resetting of Outputs: The binary outputs will be set to an invalid code upon an invalid detection of CTCSS or loss of CTCSS.

COR Input: This input controls when the unit will start to sample the audio and determine if a valid CTCSS code is available for processing.

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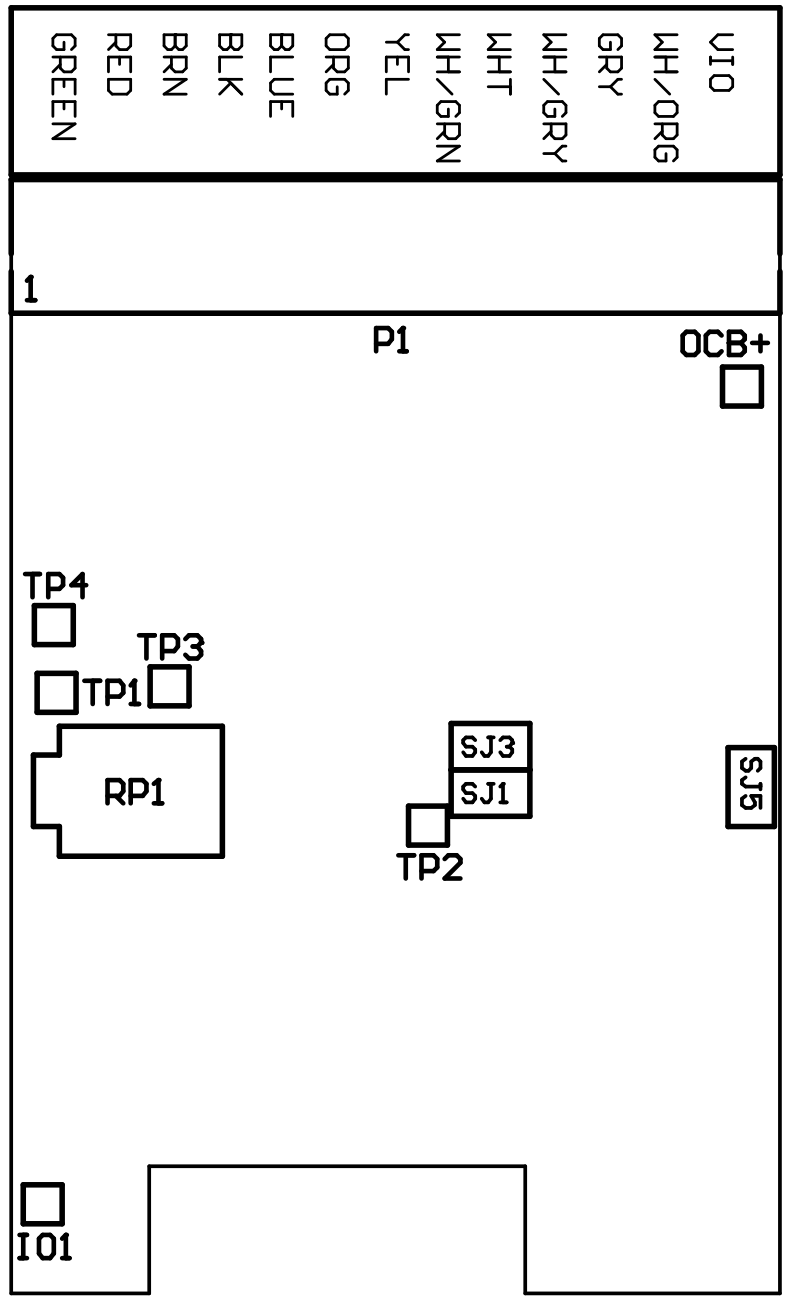

* = NOT INSTALLED

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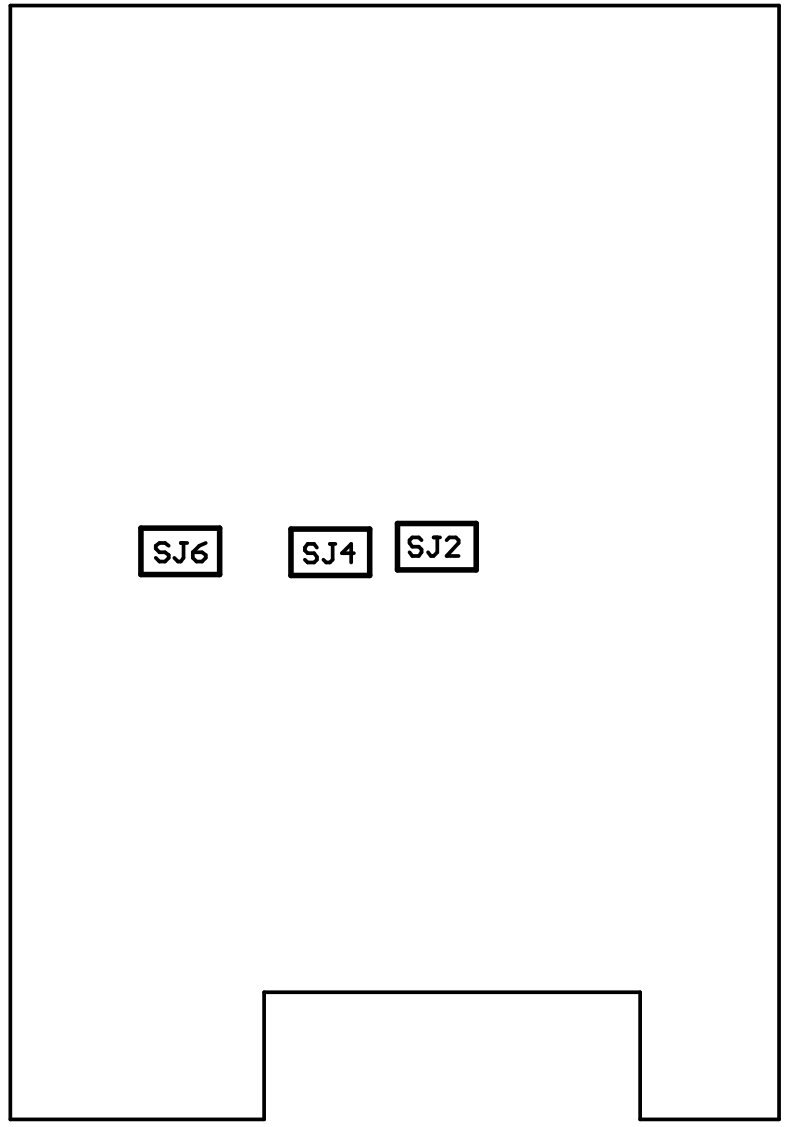

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