

1 Features

- **Light to Digital Converter for SteamVR™ Tracking Applications**
Castellated Module for Easy Prototyping
- Convert infrared light pulses to electrical envelope pulses used to track position
- 1.5MHz to 5MHz optical carrier frequencies
- 50Hz/60Hz ambient noise rejection
- Three connections: VCC, GND, ENVELOPE output
- Castellated module with 100mil center connections for easy prototyping
- Digital STANDBY input for low power standby mode.

2 Applications

- SteamVR Tracking
- Room-Scale Virtual Reality Tracking
- Virtual Reality Controllers
- Tracking of Physical Objects in VR
- Adding SteamVR™ Tracking to VR Head Mounted Displays
- Robotics Positioning
- Volumetric Entertainment Systems
- Optical Ranging
- Optical Detection
- Free-Space Optical Communication
- Low Complexity, Low Computation Requirement Embedded Tracking Systems
- Indoor and Outdoor Position Systems

For the latest TS3633-CM1 information visit [online version of TS3633-CM1 datasheet.](#)

3 Description

Triad Semiconductor's TS3633-CM1 combines Triad's TS3633 Light to Digital Converter IC with a photodiode and supporting discrete components onto a PCB module with castellated pads. The TS3633-CM1 is a complete Light to Digital sensor for SteamVR™ Tracking applications.

The castellated module requires only three connections: Power, ground, and the digital envelope output. When exposed to SteamVR Tracking modulated infrared light the module will assert low the ENVELOPE pin. The TS3633-CM1 module is 500-mils wide by 400-mils high. The module has 12 castellated pads on 100-mil centers for easy breadboard, surface mount, or flex circuit board assembly. Pin 1 is the square castellated pad next to R2.

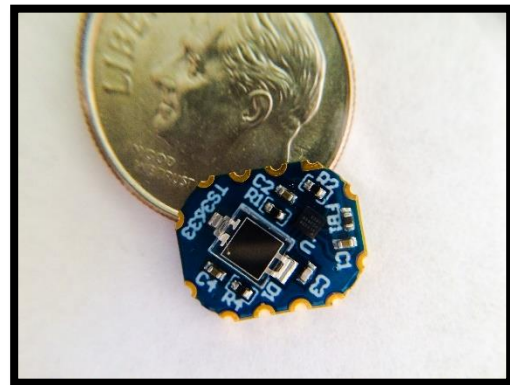


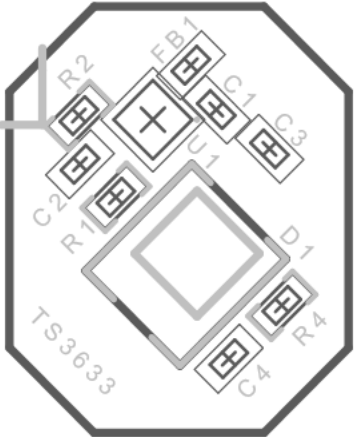
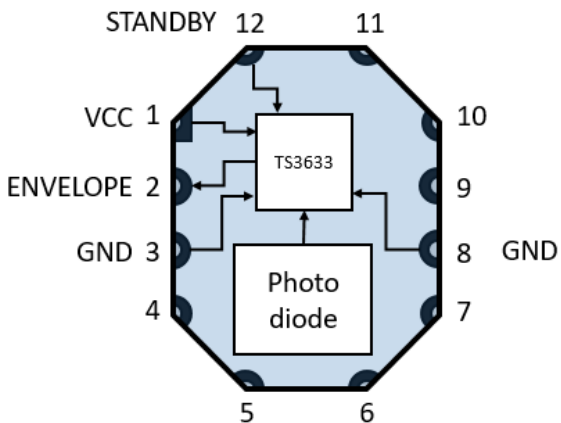
Figure 1 TS3633-CM1 Light to Digital Converter Castellated Module

4 Device Overview

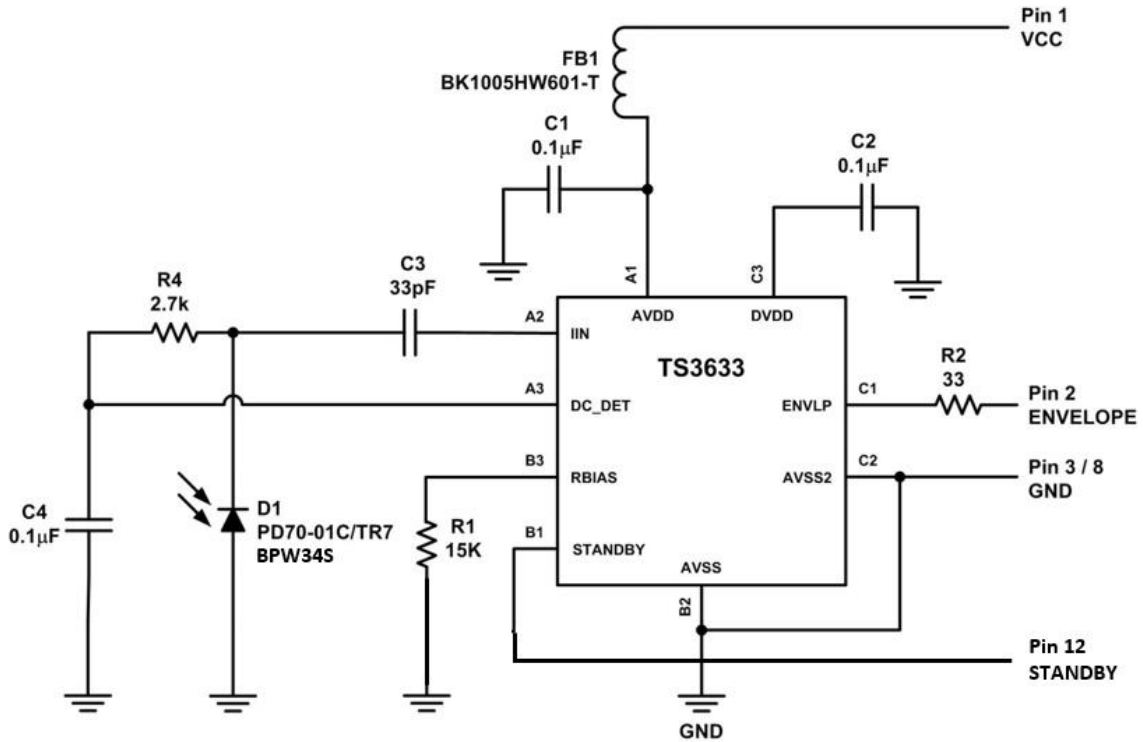
The TS3633-CM1 is a prototyping module that implements a complete Light to Digital Converter solution to support developments for SteamVR Tracking and other applications where detection of infrared (IR) light is required. Upon power up, the module is in operating mode and ready to respond, no reset signal is required. The CM1's ENVELOPE output will be asserted (logic LOW) upon incident light from an IR source once the threshold level for light intensity has been exceeded, assuming that the pulses are within the range of the specified carrier frequency, which is stated in the *Electro-Optical Characteristics* section of this datasheet. In a typical SteamVR Tracking application, the SteamVR scanning laser will appear to the photodiode as a Gaussian-like shaped pulse train as it is swept both horizontally and vertically. The ENVELOPE output will assert when the pulses exceed the input threshold level, and remain asserted as long as the CM1 receives IR input pulses that exceed the threshold limit.

4.1 Standby Mode

When the STANDBY digital input is asserted HIGH, the TS3633 is placed into a low power standby power mode. If your application does not intend to use the standby function, the STANDBY input (pin 12 on the castellated module) should be connected to ground. For details about the timing of the STANDBY input, refer to the TS3633 Light to Digital Converter Datasheet.

TS3633-CM1 Top Silk Screen (Note the line around pin 1. This line is present on Rev 2 versions of the board that support STANDBY)	TS3633-CM1 Simplified Diagram
	

5 TS3633-CM1 Schematic



6 Pin List and Package Information

#	Pin Name	Pin Type	Pin Description
1	VCC	Supply	3.3V power supply
2	ENVELOPE	Digital Output	Digital envelope signal from the TS3633
3	GND	Supply	Ground connection
4	NC		
5	NC		
6	NC		
7	NC		
8	GND	Supply	Ground connection
9	NC		
10	NC		
11	NC		
12	NC	Digital Input	Low for normal operation. High for standby.

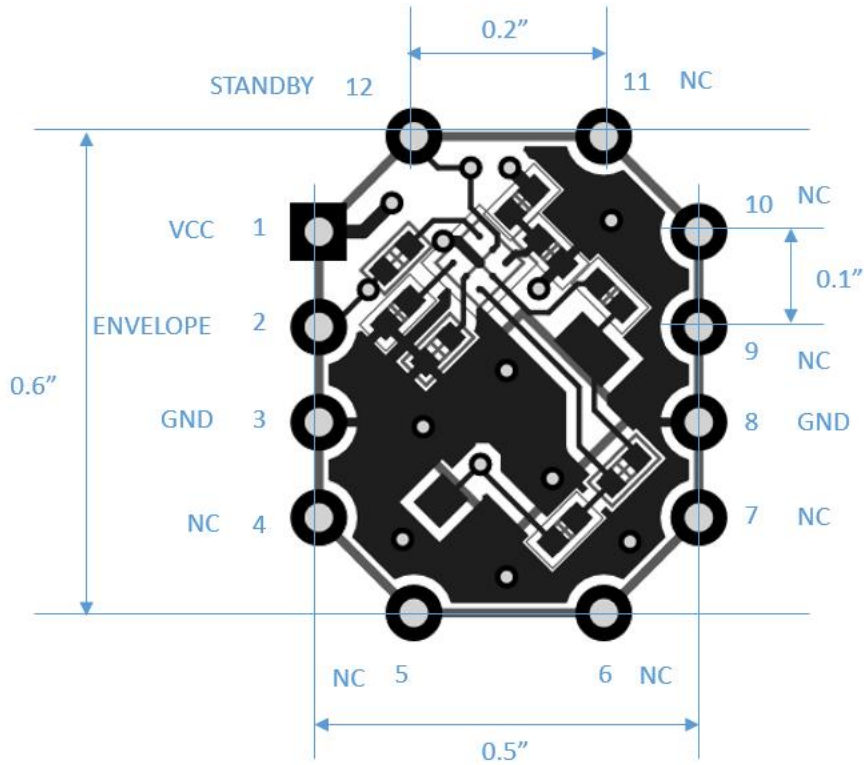


Figure 2: Top View Package

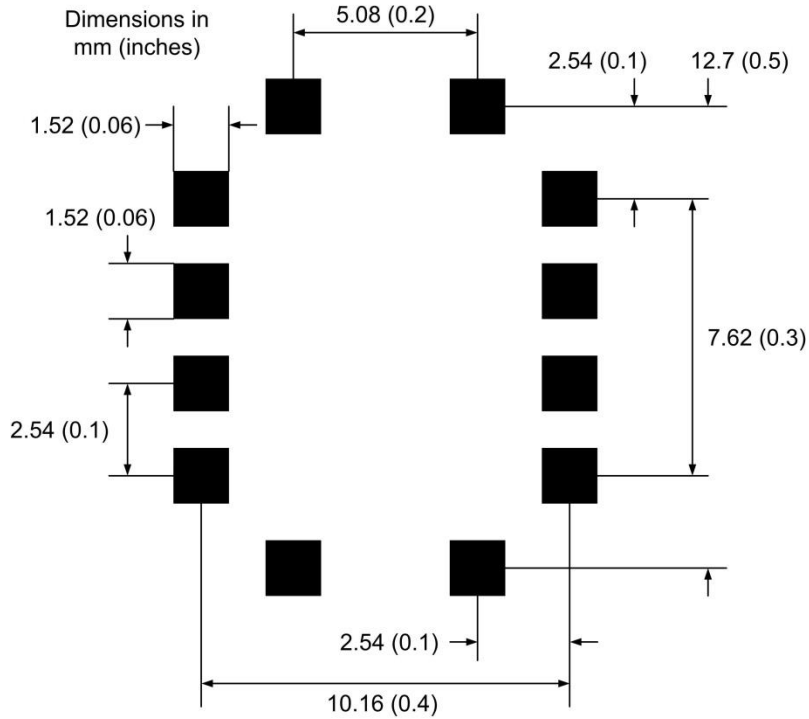


Figure 3: Footprint

7 Performance Characteristics

7.1 Absolute Maximum Ratings

Parameter ⁽¹⁾⁽²⁾	Notes/Conditions	MIN	MAX	units
Supply Voltage (VCC)			3.6	V
Storage Temperature, T _{STOR}	Storage temperature range	-40	85	°C

- (1) All Voltages are specified with respect to GND = 0Vdc
 (2) Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the module. These are stress ratings only, which do not imply functional operation of the module at these or any other conditions beyond those indicated under Recommended Operating Conditions. Exposure to absolute-maximum-rated conditions for extended periods may affect module reliability

7.2 Recommended Operating Conditions

Parameter	Notes/Conditions	MIN	TYP	MAX	units
Supply Voltage (VCC)	Operating voltage	3.0	3.3	3.6	V
T _{AMB} ⁽¹⁾	Operating ambient temperature range	0		85	°C

7.3 Electro-Optical Characteristics

Operating conditions: VCC = 3.3V, T_{AMB} = 25 °C.

Parameter	Notes/Conditions	MIN	TYP	MAX	units
Power Supply					
I _{VCC}	Operating current			7	mA
ENVELOPE Output					
V _{OL}	Output Low Voltage	@ 2 mA load		0.1 * VCC	V
V _{OH}	Output High Voltage	@ 2 mA load	0.9 * VCC		V
Optical					
Peak Sensitivity Wavelength			940		nm
Spectral Bandwidth Range	50% sensitivity relative to peak wavelength	400		1100	nm
Carrier Frequency Range	Typical 3dB passband	1.5		5	MHz

Revision History

Revision	Modifications	Modification Date
A	Initial release Rev A Datasheet	14 September 2016
B	Added Standby pin to the module	25 October 2016

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1. DEFINITIONS.

- a. "Agreement" means these Terms and Conditions for Commercial Sale of Evaluation Modules through online orders, together with all associated Purchase Orders and other addenda, documents and materials incorporated herein by reference.
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- Except as specifically agreed to in writing by both Triad and Buyer, once a Purchase Order is confirmed by Triad, such Purchase Order may not be cancelled nor Product returned for credit or refund, in whole or in part, by Buyer.
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11. **COMPLIANCE WITH LEGAL REQUIREMENTS.** Each party shall comply with all national, state and local laws and regulations governing the manufacture, transportation, import, export, and sale of Modules, including, in the United States, without limitation, US Export Control laws, including Department of Commerce and US Export Administration regulations. Modules may contain technical data that is controlled under either (i) the United States Munitions List and, as such, subject to the International Traffic in Arms Regulations (ITAR, 22 C.F.R. §§120-130); or (ii) the Commerce Control List, and as such, subject of the Export Administration Regulations (EAR, 15 C.F.R. §§730- 774). Accordingly, each party represents and warrants that it shall not transfer its own or the other party's technical data directly or indirectly to any individual, employee, company or other entity without first complying with all requirements of the ITAR, the EAR and any other applicable export restrictions, including the requirement for obtaining any export license, if applicable. Technical data that is controlled by the ITAR, EAR, or other applicable export restrictions shall not be released to foreign nationals, including foreign national employees, whether in the United States or abroad, without first obtaining the appropriate export license or other approval from the US government and otherwise complying with all applicable governmental requirements, as they may be amended from time to time.
12. **MERGER, MODIFICATION, WAIVER, AND REMEDIES.** This Agreement contains the entire understanding between Buyer and Triad with respect to the subject matter hereof and merges and supersedes all prior and contemporaneous agreements, dealings, and negotiations. No modification, alteration, or amendment shall be effective unless made in writing, dated and signed by duly authorized representatives of both parties. No waiver of any breach hereof shall be held to be a waiver of any other or subsequent breach. Each party's rights and remedies herein are in addition to any other rights and remedies provided by law or in equity. If any provision of this Agreement is determined by a court of competent jurisdiction to be invalid, illegal, or unenforceable, such determination shall not affect the validity of the remaining provisions.
13. **ASSIGNMENT.** Neither party may assign any rights in nor delegate any obligations under this Agreement without the written consent of the other. For purposes of this Section 12, the acquisition, merger, consolidation, or change in control of a party or any assignment by operation of law shall not be deemed an assignment that requires the other party's written consent. Nothing in this Section 12 will in any way limit Triad's right to use third party manufacturers and foundries of Triad's choosing to fabricate the Modules.
14. **APPLICABLE LAW.** This Agreement is to be construed and interpreted according to the laws of the State of North Carolina, excluding its conflict of laws provisions. The provisions of the United Nations Convention on Contracts for the International Sale of Goods shall not apply to this Agreement.
15. **SPECIFIC PERFORMANCE.** Each party agrees that its failure to perform certain obligations hereunder would cause irreparable damage to the other party, and that monetary damages would not provide an adequate remedy in such event. Accordingly, the parties agree that, in addition to any other remedy to which the non-breaching party may be entitled, at law or in equity, the non-breaching party shall be entitled to injunctive relief to prevent breaches of this Agreement, and an order of specific performance to compel performance of such obligations in any action instituted in any court of the United States or any state thereof having subject matter jurisdiction.
16. **NOTICES.** All notices to either party regarding this Agreement must be in writing given by either hand delivery, overnight courier, first class mail, electronic mail, or facsimile, properly addressed and all fees and postage prepaid. All such notices will be deemed to be sufficiently made as follows: (i) on the date given, if given by hand delivery, electronic mail, or facsimile, provided, however, that any notice given by electronic mail or facsimile must be confirmed in writing and mailed within ten days to the other party by first class mail; and (ii) on the date after being deposited with overnight courier or U.S. mail, if given by overnight courier or first class mail.
17. **DISPUTE RESOLUTION.** All disputes arising directly under the express terms of this Agreement or the grounds for termination thereof shall be resolved as follows: The senior management of both parties shall meet to attempt to resolve such disputes. If the disputes cannot be resolved by the senior management, either party may make a written demand for formal dispute resolution through arbitration and specify therein the scope of the dispute. Any controversy or dispute arising under this Agreement shall be referred to and finally settled by arbitration in the City of Winston-Salem, North Carolina, USA, under the auspices of, and conducted in accordance with, the rules of the American Arbitration Association. All arbitration proceedings shall be before a board of three arbitrators who are knowledgeable about goods substantially similar to the Modules and each party shall select one arbitrator and the selected arbitrators shall select the third arbitrator. The arbitration proceedings shall be conducted in the English language and any award shall be in United States dollars. The cost of the third arbitrator shall be divided equally between the parties and each party shall pay the costs of the arbitrator selected by it. Any award of the arbitrators shall be final and conclusive on the parties to this Agreement, and judgment upon such award may be entered and enforced in any court having jurisdiction thereof. With the exception of an action brought to enforce the terms of a previous arbitration award, arbitration shall be the sole and exclusive method of resolving disputes between the parties in connection with this Agreement.

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<https://partner.steamgames.com/vrtracking/>.

Latest information about the TS3633-CM1 may be found at www.triadsemi.com/product/TS3633-CM1.

Triad Semiconductor designs and manufactures analog and mixed signal integrated circuits. Founded in 2002, Triad provides custom IC, ASSP and standard product solutions to customers in all major markets.

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