



EDISON OPTO CORPORATION

DATA SHEET

Edi-Tensor

TS1003



Date : 2009/01/07

Version : 1



EDISON OPTO CORPORATION
Office:4F, No. 800, Chung-Cheng Rd,
Chung-Ho, Taipei 235, Taiwan

Tel: 886-2-8227-6996

Fax: 886-2-8227-6997

<http://www.edison-opto.com.tw>

Technical Data Sheet- Edi-Tensor Part Number: TS1003

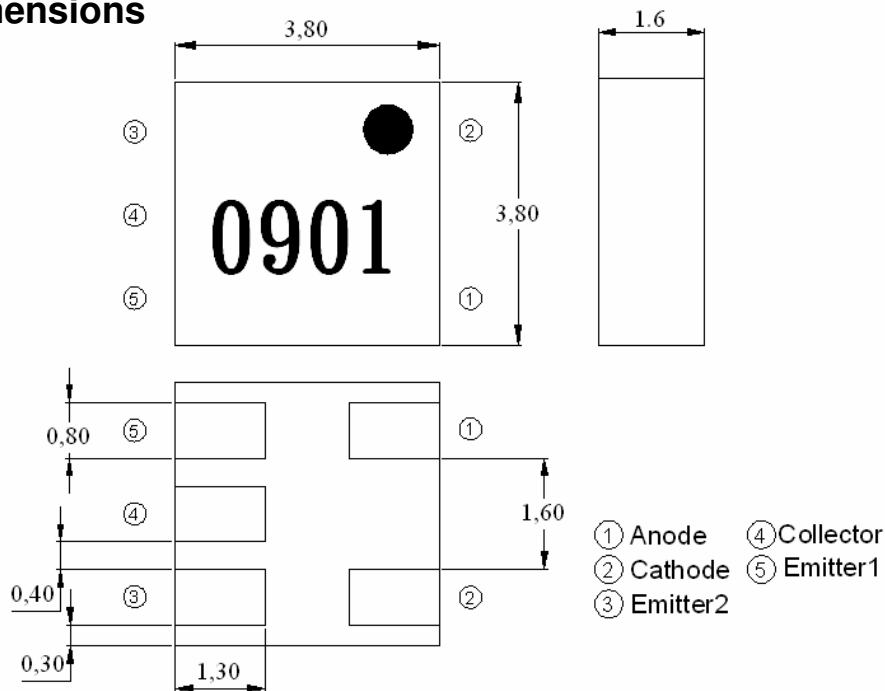
Applications

- DSC(Digital steal cameras)
- Camcorders
- Mobile phone
- PDA
- Projector

Features

- Subminiature SMD Type
- 4-phase output type
- Able to detect the full rotation(360°) by non-contact structure.

Package Dimensions



- Unspecified tolerance: $\pm 0.2\text{mm}$
- Burr is not included in the dimensions.
- Burr's dimensions: 0.15mm max.

Device Selection Guide

Input Current (mA)	Output operating voltage (V)
3	2.8

Technical Data Sheet- Edi-Tensor Part Number: TS1003

Absolute Maximum Ratings(Ta = 25°C)

Parameter		Symbol	Rating	Unit
Input	Forward current	I_F	50	mA
	Reverse voltage	V_R	5	V
	Power dissipation	P	70	mW
Output	Collector-emitter voltage	V_{CE10}	35	V
		V_{CE20}		
	Emitter-collector voltage	V_{E1CO}	6	V
		V_{E2CO}		
	Collector current	I_C	20	mA
Collector Power dissipation	P_C	75	mW	
Storage Temperature		T_{stg}	-30 to 85	°C
Operating Temperature		T_{opr}	-25 to 85	°C
Soldering Temperature		T_{sol}	260*	°C

*Soldering time ≤ 10 s.

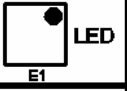

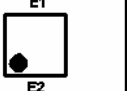
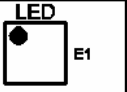
Electro-Optical Characteristics

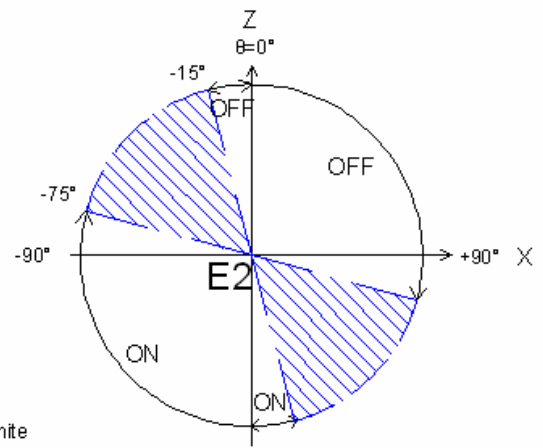
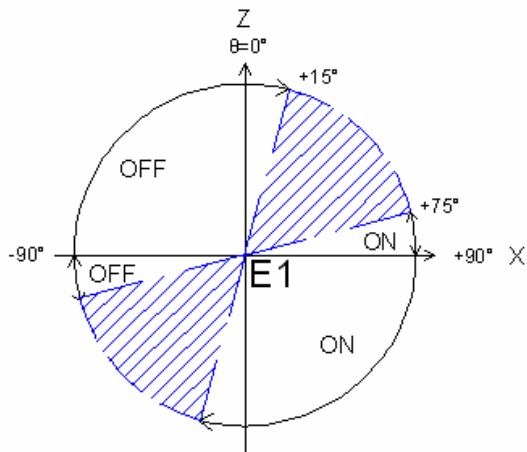
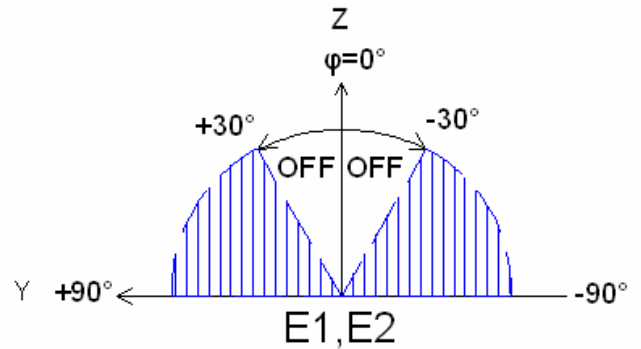
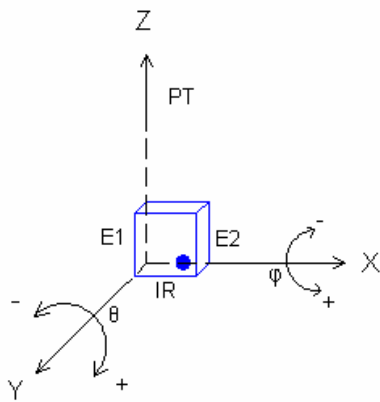
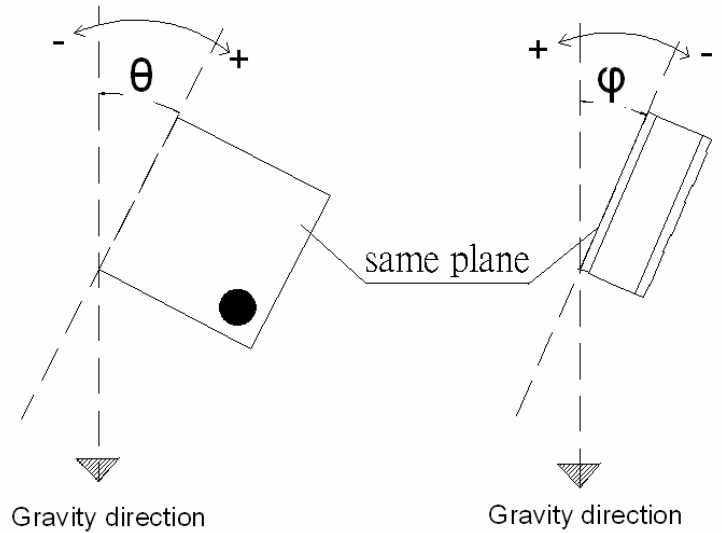
Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit	
Input	Forward voltage	V_F	$I_F=20mA$	-	1.25	1.3	V	
	Reverse current	I_R	$V_R=5V$	-	-	10	μA	
*1 Output	Collector dark current	I_{CE}	$V_{CE}=20V$	-	-	50	nA	
*1 Coupling Characteristics	Collector current	I_C	$V_{CE}=2.8V, R_1=470\Omega$	100	-	-	μA	
	*2 Leak current	I_{LEAK}	$V_{CE}=2.8V, R_1=470\Omega$	-	-	20	μA	
	Response time	Rise time	t_r	$V_{CE}=2.8V, I_C=100\mu A$	-	50	150	μs
		Fall time	t_f	$R_L=1000\Omega$	-	50	150	μs
Collector-emitter saturation voltage		$V_{CE(sat)}$	$I_F=2mA, I_C=100\mu A$	-	-	0.3	V	

*1 Output and coupling characteristics are common to the both phototransistors.

*2 Leak current is the output of transistor when $\theta=0^\circ$ or $\pm 90^\circ$, $\phi=0^\circ$ and $I_C=OFF$.

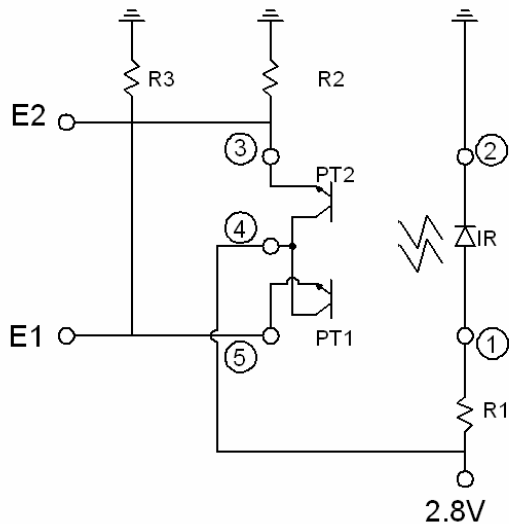
Detecting Rotation Characteristics

	E1	E2
	0	1
	0	0
	1	0
	1	1



 Indefinite

Application Circuit



- *1 R1=470 ohm
- *2 R2=R3=33K ohm
- *3 E1 and E2 be connected to DSP

Note :

E1 : Output current of phototransistors PT1

E2 : Output current of phototransistors PT2

ON : Output current of phototransistors : 100 μ A or more

OFF : Output current of phototransistors : 20 μ A or less

Output current of ON/OFF is output when device is at a standstill

Technical Data Sheet- Edi-Tensor Part Number: TS1003

JEDEC Information

JEDEC is used to determine what classification level should be used for initial reliability qualification. Once identified, the component can be properly packaged, stored and handled to avoid subsequent thermal and mechanical damage during the assembly solder attachment and/or repair operation. The present moisture sensitivity standard contains six levels, the lower the level, the longer the devices floor life. TS1003 is certified at level 2a. This means TS1003 has a floor life of 4 weeks before TS1003 need to re-baked.

< JEDEC characteristics for TS1003 >

Level	Floor Life		Soak Requirements			
	Time	Condition	Standard		Accelerated Environment	
			Time (hours)	Condition	Time (hours)	Condition
2a	4 weeks	≤ 30°C / 60% RH	696 +5/-0	30°C / 60% RH	120 +1/-0	60°C / 60% RH

Level	Floor Life		Soak Requirements			
	Time	Condition	Standard		Accelerated Equivalent	
			Time(hours)	Condition	Time(hours)	Condition
1	Unlimited	≤ 30°C / 85% RH	168 +5/-0	85°C / 85% RH		
2	1 year	≤ 30°C / 60% RH	168 +5/-0	85°C / 60% RH		
2a	4 weeks	≤ 30°C / 60% RH	696 ¹ +5/-0	30°C / 60% RH	120 +1/-0	60°C / 60% RH
3	168 hours	≤ 30°C / 60% RH	192 ¹ +5/-0	30°C / 60% RH	40 +5/-0	60°C / 60% RH
4	72 hours	≤ 30°C / 60% RH	96 ¹ +5/-0	30°C / 60% RH	20 +5/-0	60°C / 60% RH
5	48 hours	≤ 30°C / 60% RH	72 ¹ +5/-0	30°C / 60% RH	15 +5/-0	60°C / 60% RH
5a	24 hours	≤ 30°C / 60% RH	48 ¹ +5/-0	30°C / 60% RH	10 +5/-0	60°C / 60% RH
6	Time on tabel (TOL)	≤ 30°C / 60% RH	TOL	30°C / 60% RH		

Note:

The standard soak time includes a default value of 24 hours for semiconductor manufacturer's exposure time (MET) between bake and bag, and includes maximum time allowed out of the bag at the distributor's facility.

Technical Data Sheet- Edi-Tensor Part Number: TS1003

Reliability Test Items

The following table describes operating life, mechanical, and environmental tests performed on TS1003.

Reliability Test 1

Stress Test	Stress Conditions	Stress Duration	Failure Criteria
Temperature and Humidity	60°C / 60%RH	120 hours	I _c <L I _{LEAK} >U
IR Reflow	Peak temp.=255~260°C *3 times	3 times	

Reliability Test 2

Stress Test	Stress Conditions	Stress Duration	Failure Criteria
High Temperature and high Humidity Life	85°C / 85%RH, I _F = 3mA	1000 hours	I _c <L I _{LEAK} >U
Low Temperature Storage	-40°C	1000 hours	
High Temperature Storage	100°C	1000 hours	
Temperature Cycle	-40°C/100°C ,30 min dwell < 15 min transfer	20 cycles	

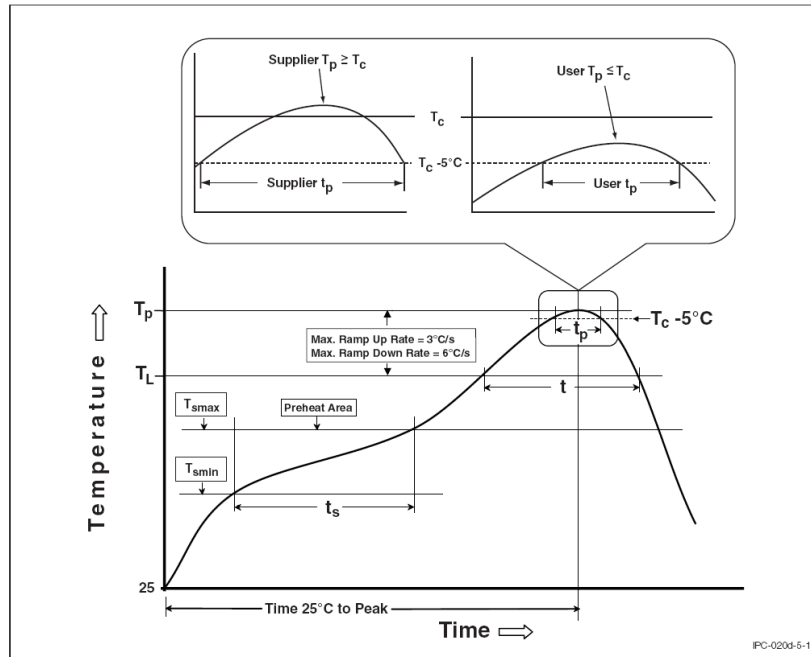
Note:

1. Reliability test 2 is performed after reliability test 1.
2. I_c is a collector current and I_{LEAK} is a leak current.
3. U is the upper specification limit and L is the lower specification limit.

Technical Data Sheet- Edi-Tensor Part Number: TS1003

IR reflow reference curve

The following reflow soldering profiles are provided for reference. It is recommended that users follow the recommended soldering profile provided by the manufacturer of the solder paste used.



< Table of Classification Reflow Profiles >

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak		
Temperature min (T_{smin})	100 °C	150 °C
Temperature max (T_{smax})	150 °C	200 °C
Time (T_{smin} to T_{smax}) (t_s)	60-120 seconds	60-120 seconds
Average ramp-up rate (T_{smax} to T_p)	3 °C/second max.	3 °C/second max.
Liquidous temperature (T_l)	183 °C	217 °C
Time at liquidous (t_l)	60-150 seconds	60-150 seconds
Peak package body temperature (T_p)*	230 °C ~235 °C *	255 °C ~260 °C *
Classification temperature (T_c)	235 °C	260 °C
Time (t_p)** within 5 °C of the specified classification temperature (T_c)	20** seconds	30** seconds
Average ramp-down rate (T_p to T_{smax})	6 °C/second max.	6 °C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

* Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum.

** Tolerance for time at peak profile temperature (t_p) is defined as a supplier minimum and a user maximum.

Package

Item	Quantity	Total	Dimensions(mm)
Reel	1,000 pcs	1,000 pcs	Diameter=178 ; width=12
Inner box	4 reels	4,000 pcs	240*235*67
Outer box	5 inner boxes	20,000 pcs	353*254*256

