LITEON®
OPTOELECTRONICS

Photocoupler

Product Data Sheet

LTV-0701

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LITE-ON DCC

RELEASE

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LTV-0701

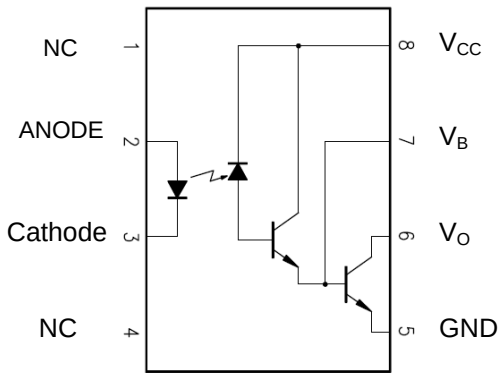
Single Channel, High Speed Optocouplers

Lead Free RoHS COMPLIANT

Description

These high gain series couplers use a light emitter diode and an integrated high gain photo detector to provide extremely high current transfer ratio between input and output. Separate pins for the photodiode and output stage result in TTL compatible saturation voltage and high speed operation. Where desired the Vcc and Vo terminals may be tied together to achieve conventional photo darlington operation. A base access terminal allows a gain bandwidth adjustment to be made.

Functional Diagram



6N138 / 139

Truth Table (Positive Logic)

LED	OUT
ON	L
OFF	H

A 0.1μF bypass Capacitor must be connected between Pin8 and Pin5

Features

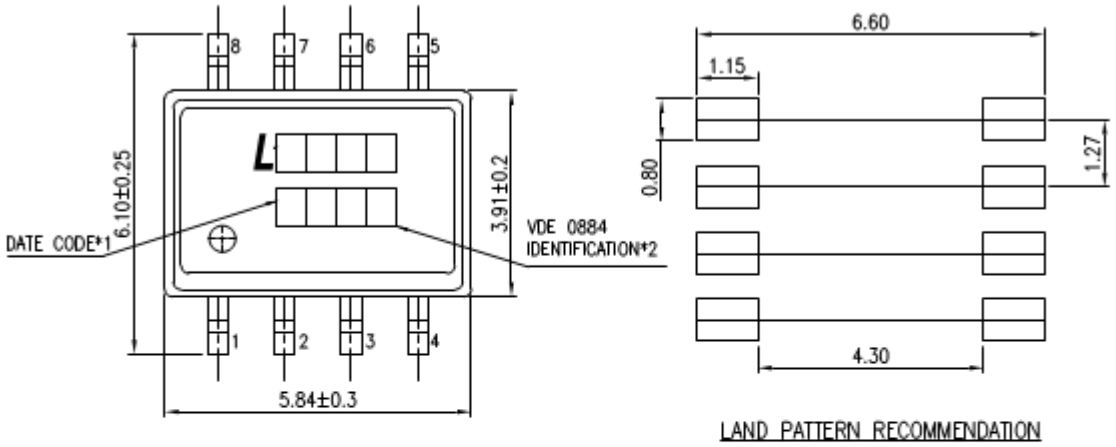
- SO8 package
- High current transfer ratio – 2000% typical.
- Low input current requirements – 0.5mA
- High output current – 60mA
- CTR guarantee – 0~70℃.
- Instantaneous common mode rejection 10KV/ μ sec
- TTL compatible output – 0.1V V_{OL} typical

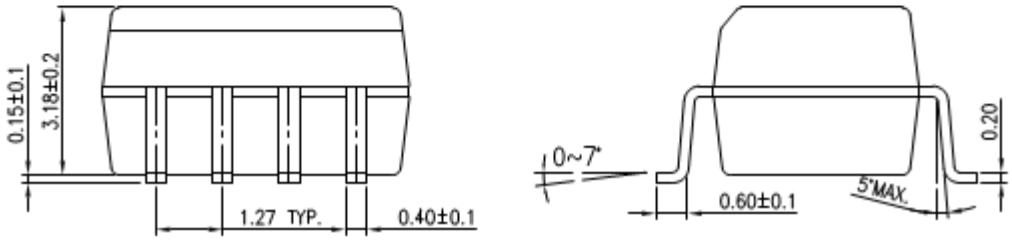
APPLICATIONS

- Digital logic ground isolation
- Low input current line receiver
- Telephone ring detector
- EIA-RS-232C line receiver
- Current loop receiver
- High common mode noise line receiver

Package Dimensions

SO8 Package (LTV-0701)

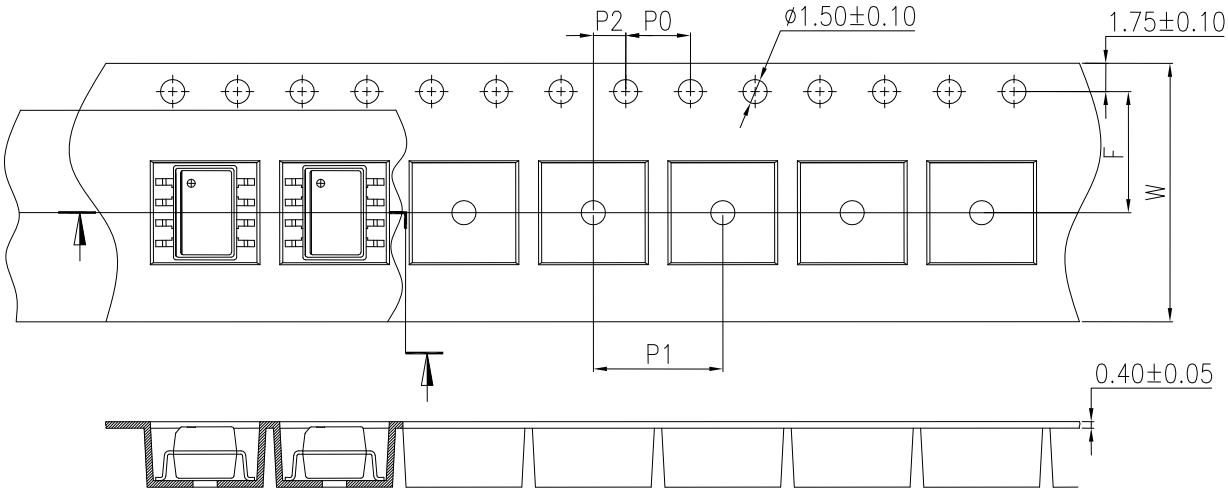




*1. Date code
*2. "V" to represent VDE0884

Dimensions are all in Millimeters.

Taping Dimensions



Description	Symbol	Dimensions in millimeters (inches)
Tape wide	W	16.0±0.30(0.63)
Pitch of sprocket holes	P0	4.0±0.10(0.15)
Distance of compartment	F P2	7.5±0.10(0.295) 2±0.10(0.079)
Distance of compartment to compartment	P1	8.0±0.10(0.47)

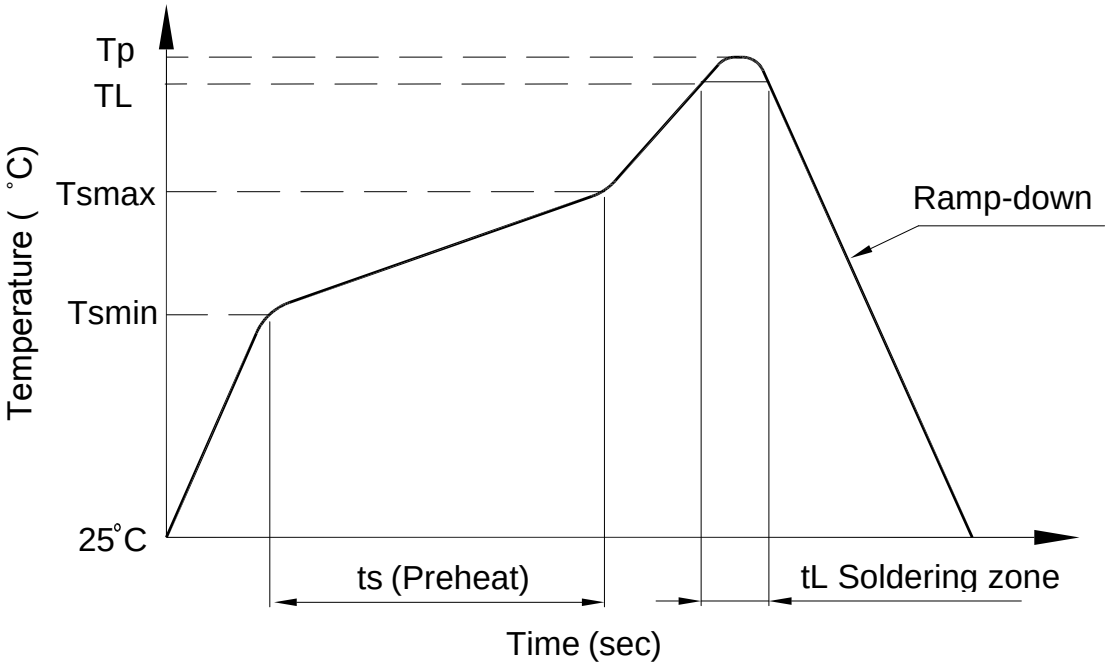
Quantities Per Reel

Package Type	LTV-0701
Quantities (pcs)	**2000**

Recommended Lead Free Reflow Profile

One time soldering reflow is recommended within the conditions below:

Profile item	Conditions
Preheat - Temperature Min (Tsmin) - Temperature Max (Tsmax) - Time (Min to Max) (Ts)	 150˚C 180˚C 90±30˚C
Soldering zone - Temperature (TL) - Time (tL)	 250˚C 10~15 sec
Peak temperature (TP)	260˚C
Ramp-down rate	3˚~ 6˚C / sec



Absolute Maximum Ratings*1

Parameter	Symbol	Device	Min	TYP	Max	Units
Storage Temperature	T_{ST}	LTV-0701	-55		125	°C
Operating Temperature	T_A		-40		85	°C
Isolation Voltage	V_{ISO}		3750			V_{RMS}
Supply Voltage	V_{CC}		-0.5		7	V
Lead Solder Temperature * 2	T_{SOL}				260	°C
Input						
Average Forward Input Current	I_F	LTV-0701			20	mA
Reverse Input Voltage	V_R				5	V
Input Power Dissipation	P_I				35	mW
Output						
Average Output Current	I_O	LTV-0701			60	mA
Supply Voltage, Output Voltage	Vcc, V_O		-0.5		18	V
Output Collector Power Dissipation	P_O				100	mW

1.Ambient temperature = 25°C, unless otherwise specified. Stresses exceeding the absolute maximum ratings can cause permanent damage to the device. Exposure to absolute maximum ratings for long periods of time can adversely affect reliability.

2. 260°C for 10 seconds. Refer to Lead Free Reflow Profile.

Electrical Specifications

Parameters	Test Condition	Symbol	Device	Min	Typ	Max	Units
Input							
Input Forward Voltage	I_F =1.6mA, T_A=25℃	V_F	LTV-0701	1.25	1.40	1.75	V
Input Forward Voltage Temperature Coefficient	IF=1.6mA	$\Delta V_F/\Delta Ta$			-1.8		mV/℃
Input Reverse Voltage	I_R = 10μA T_A=25℃	BV_R		5	-	-	V
Input Capacitance	V_F=0; f=1MH$_Z$	C_{IN}		-	60	-	pF
Detector							
Current transfer ratio	I_F=0.5mA;Vo=0.4V; Vcc=4.5V	CTR	LTV-0701	400	2000	5000	%
	I_F=1.6mA;Vcc=0.4V; Vcc=4.5V			500	1600	2600	
Logic low output voltage	I_F=0.5mA;Vcc=4.5V; I_o=2mA	V_{OL}			0.1	0.4	V
	I_F=1.6mA;Vcc=4.5V; I_o=8mA						
	I_F=5mA;Vcc=4.5V; I_o=15mA						
	I_F=12mA;Vcc=4.5V; I_o=24mA				0.2		
Logic high output current	I_F=0mA, Vo=Vcc=18V T_A=25℃	I_{OH}			0.05	100	μA
Logic low supply current	I_F=1.6mA, V_o=open (Vcc=18V)	I_{ccL}		-	0.4	1.5	mA
Logic high supply current	I_F=0mA, V_o=open ; T_A=25℃ (Vcc=18V)	I_{ccH}		-	0.01	10	mA

*All Typical at T_A =25℃

SWITCHING SPECIFICATIONS (AC)

Parameter	Test Condition	Symbol	Device	Min	Typ	Max	Units
Propagation Delay Time to Low Output Level	I_F=0.5mA; R_L=4.7KΩ	t_{PHL}	LTV-0701		5	25	μs
	I_F=12mA; R_L=270Ω				0.2	1	
Propagation Delay Time to High Output Level	I_F=0.5mA; R_L=4.7KΩ	t_{PLH}			18	60	μs
	I_F=12mA; R_L=270Ω			-	2	7	
Logic High Common Mode Transient Immunity	I_F=0mA; $\|V_{CM}\|$=10V_{p-p} R_L=2.2KΩ	$\|CM_H\|$		1	10	-	KV/μs
							KV/μs
Logic Low Common Mode Transient Immunity	I_F=1.6mA; $\|V_{CM}\|$=10V_{p-p} R_L=2.2KΩ	$\|CM_L\|$		1	10	-	KV/μs
							KV/μs

*All Typical at T_A=25℃

Isolation Characteristics

Parameter	Test Condition	Symbol	Min	Typ	Max	Units
Input-Output Insulation Leakage Current	45% RH, t = 5s, V_{I-O} = 3kV DC, T_A = 25°C	I_{I-O}			1.0	μA
Withstand Insulation Test Voltage	RH ≤ 50%, t = 1min, T_A = 25°C	V_{ISO}	3750			V_{RMS}
Input-Output Resistance	V_{I-O} = 500V DC	R_{I-O}		10^{12}		Ω

*All Typical at T_A =25℃

Notes,

1. AC For 1 Minute, R.H. = 40 ~ 60%. Isolation voltage shall be measured using the following method.

(1) Short between anode and cathode on the primary side and between collector and emitter on the secondary side.

(2) The isolation voltage tester with zero-cross circuit shall be used.

(3) The waveform of applied voltage shall be a sine wave.

2. For 10 Seconds

3. Current Transfer Ratio (CTR) is defined as the ration of output collector current, Io, to the forward LED input current, IF, times 100%.

4. Pin 7 open.

5. Instantaneous common mode rejection voltage "output (1)" represents a common mode voltage variation that can hold the output above (1) level (Vo>2.0V).Instantaneous common mode rejection voltage "output (0)" represents a common mode voltage variation that can hold the output above (0) level (Vo<0.8V).

6. Device considered a two terminal device. Pins 1, 2, 3 and 4 shorted together and Pins 5, 6, 7 and 8 shorted together.

Switching Time Test Circuit

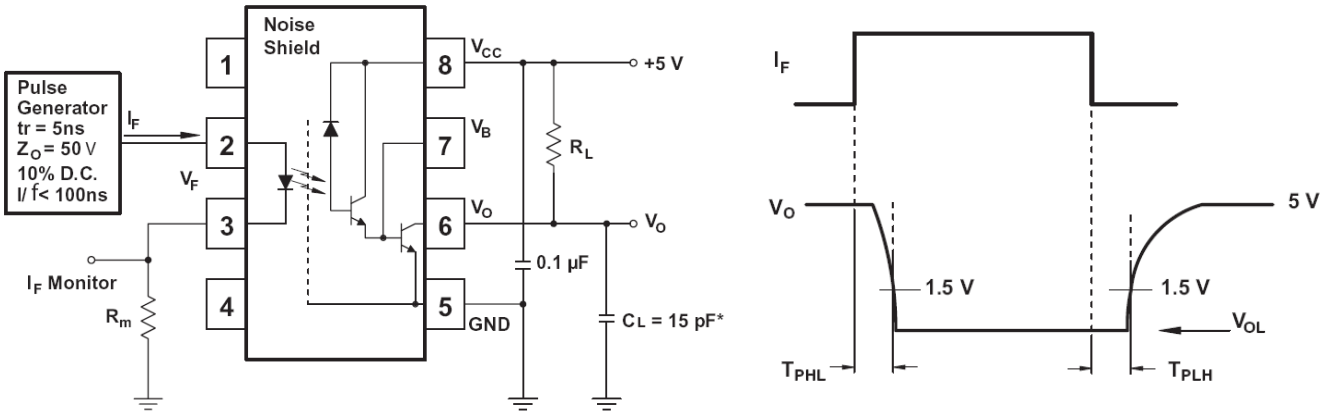


Figure 1: Single Channel Test Circuit for t_{PHL} and t_{PLH}

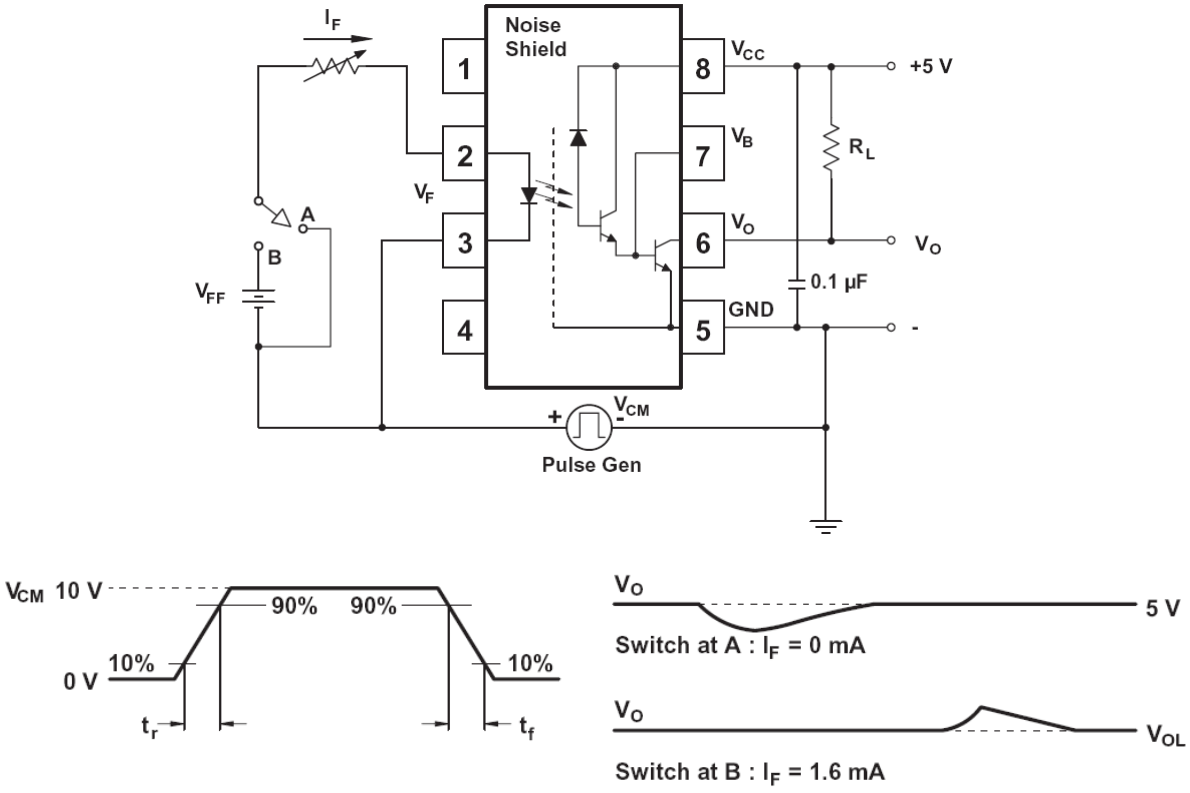


Figure 2: Single Channel Test Circuit for Common Mode Transient Immunity

Notes:

Specifications of the products displayed herein are subject to change without notice.

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