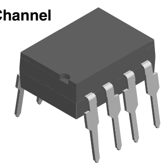
THE DATASHEET OF

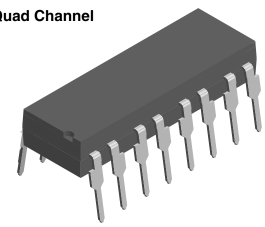
ILQ621-X007

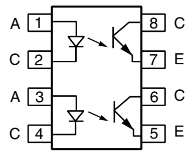
Optocoupler, Phototransistor Output (Dual, Quad Channel)

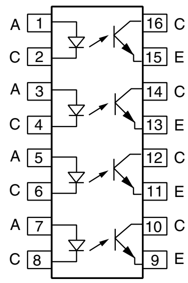
Dual Channel



Quad Channel







LINKS TO ADDITIONAL RESOURCES

Related Documents

FEATURES

- Alternate source to TLP621-2, TLP621-4 and TLP621GB-2, TLP621GB-4
- High collector emitter voltage, BV_{CEO} = 70 V
- Dual and quad packages feature:
  - Lower pin and parts count
  - Better channel to channel CTR match
  - Improved common mode rejection
- Isolation rated voltage 4420 V_{RMS}
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

AGENCY APPROVALS

- UL
- cUL
- DIN EN 60747-5-5 (VDE 0884-5), available with option 1
- CQC GB4943.1
- CQC GB8898
- FIMKO

DESCRIPTION

The ILD621, ILQ621, ILD621GB, ILQ621GB are multi-channel phototransistor optocouplers that use GaAs IRED emitters and high gain NPN silicon phototransistors. These devices are constructed using double molded insulation technology.

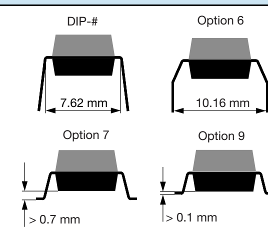
The ILD621, ILQ621GB is well suited for CMOS interfacing given the CTR_{CEsat} of 30 % minimum at I_F of 1.0 mA. High gain linear operation is guaranteed by a minimum CTR_{CE} of 100 % at 5.0 mA. The ILD621, ILQ621 has a guaranteed CTR_{CE} 50 % minimum at 5.0 mA. The transparent ion shield insures stable DC gain in applications such as power supply feedback circuits, where constant DC V_{IO} voltages are present.

ORDERING INFORMATION

I	L	x	6	2	1	x	x	-	X	0	#	#

PART NUMBER (I L x 6 2 1 x x) — PACKAGE OPTION (X 0 # #)

x = D (Dual) or Q (Quad)



AGENCY CERTIFIED / PACKAGE	DUAL CHANNEL		QUAD CHANNEL	
	CTR (%)			
UL, cUL, CSA, CQC, FIMKO	**> 50**	**> 100**	**> 50**	**> 100**
DIP-8	-	ILD621GB	-	-
SMD-8, option 7	ILD621-X007T	ILD621GB-X007T	-	-
DIP-16	-	-	ILQ621	ILQ621GB
DIP-16, option 6	-	-	ILQ621-X006	-
SMD-16, option 7	-	-	ILQ621-X007T	-
SMD-16, option 9	-	-	-	ILQ621GB-X009
VDE, UL, cUL, CSA, CQC, FIMKO	**> 50**	**> 100**	**> 50**	**> 100**
DIP-16	-	-	-	ILQ621GB-X001
SMD-16, option 7	-	-	-	ILQ621GB-X017T

Note

- For additional information on the available options refer to option information

ABSOLUTE MAXIMUM RATINGS (T_{amb} = 25 °C, unless otherwise specified)					
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**VALUE**	**UNIT**
INPUT					
Reverse voltage			V_R	6.0	V
Forward current			I_F	60	mA
Surge current			I_{FSM}	1.5	A
Power dissipation			P_{diss}	100	mW
Derate from 25 °C				1.33	mW/°C
OUTPUT					
Collector emitter reverse voltage			V_{CEO}	70	V
Collector current			I_C	50	mA
	t < 1.0 ms		I_C	100	mA
Power dissipation			P_{diss}	150	mW
Derate from 25 °C				-2.0	mW/°C
COUPLER					
Package dissipation		ILD621		400	mW
		ILD621GB		400	mW
Derate from 25 °C				5.33	mW/°C
Package dissipation		ILQ621		500	mW
		ILQ621GB		500	mW
Derate from 25 °C				6.67	mW/°C
Storage temperature			T_{stg}	-55 to +150	°C
Operating temperature			T_{amb}	-55 to +100	°C
Junction temperature			T_j	100	°C
Soldering temperature (1)	2.0 mm from case bottom		T_{sld}	260	°C

Notes

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability.

(1) Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).

ELECTRICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
INPUT							
Forward voltage	I_F = 10 mA		V_F	1.0	1.15	1.3	V
Reverse current	V_R = 6.0 V		I_R	-	0.01	10	μA
Capacitance	V_R = 0 V, f = 1.0 MHz		C_O	-	40	-	pF
Thermal resistance, junction to lead			R_{THJL}	-	750	-	K/W
OUTPUT							
Collector emitter capacitance	V_{CE} = 5.0 V, f = 1.0 MHz		C_{CE}	-	6.8	-	pF
Collector emitter leakage current	V_{CE} = 24 V		I_{CEO}	-	10	100	nA
			I_{CEO}	-	20	50	μA
Thermal resistance, junction to lead			R_{THJL}	-	500	-	K/W
COUPLER							
Capacitance (input to output)	V_{IO} = 0 V, f = 1.0 MHz		C_{IO}	0.8	-	-	pF
Insulation resistance	V_{IO} = 500 V			10^{12}	-	-	Ω
Channel to channel insulation				500	-	-	VAC
Collector emitter saturation voltage	I_F = 8.0 mA, I_{CE} = 2.4 mA	ILD621	V_{CEsat}	-	-	0.4	V
		ILQ621					
	I_F = 1.0 mA, I_{CE} = 0.2 mA	ILD621GB	V_{CEsat}	-	-	0.4	V
		ILQ621GB					

Note

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements.

CURRENT TRANSFER RATIO							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Channel/channel CTR match	I_F = 5.0 mA, V_{CE} = 5.0 V		CTRX/CTRY	1 to 1	-	3 to 1	%
Current transfer ratio (collector emitter saturated)	I_F = 1.0 mA, V_{CE} = 0.4 V	ILD621	CTR_{CEsat}	-	60	-	%
		ILQ621	CTR_{CEsat}	-	60	-	%
		ILD621GB	CTR_{CEsat}	30	-	-	%
		ILQ621GB	CTR_{CEsat}	30	-	-	%
Current transfer ratio (collector emitter)	I_F = 5.0 mA, V_{CE} = 5.0 V	ILD621	CTR_{CE}	50	80	600	%
		ILQ621	CTR_{CE}	50	80	600	%
		ILD621GB	CTR_{CE}	100	200	600	%
		ILQ621GB	CTR_{CE}	100	200	600	%

SWITCHING CHARACTERISTICS						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
NON-SATURATED						
On time	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω, 50 % of V_{PP}	t_{on}	-	3.0	-	μs
Rise time	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω, 50 % of V_{PP}	t_r	-	2.0	-	μs
Off time	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω, 50 % of V_{PP}	t_{off}	-	2.3	-	μs
Fall time	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω, 50 % of V_{PP}	t_f	-	2.0	-	μs
Propagation H to L	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω, 50 % of V_{PP}	t_{PHL}	-	1.1	-	μs
Propagation L to H	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 75 Ω, 50 % of V_{PP}	t_{PLH}	-	2.5	-	μs
SATURATED						
On time	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 1 kΩ, V_{TH} = 1.5 V	t_{on}	-	4.3	-	μs
Rise time	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 1 kΩ, V_{TH} = 1.5 V	t_r	-	2.8	-	μs
Off time	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 1 kΩ, V_{TH} = 1.5 V	t_{off}	-	2.5	-	μs
Fall time	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 1 kΩ, V_{TH} = 1.5 V	t_f	-	11	-	μs
Propagation H to L	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 1 kΩ, V_{TH} = 1.5 V	t_{PHL}	-	2.6	-	μs
Propagation L to H	I_F = 10 mA, V_{CC} = 5.0 V, R_L = 1 kΩ, V_{TH} = 1.5 V	t_{PLH}	-	7.2	-	μs

COMMON MODE TRANSIENT IMMUNITY						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Common mode rejection, output high	V_{CM} = 50 V_{P-P}, R_L = 1.0 kΩ, I_F = 0 mA	CM_H	-	5000	-	V/μs
Common mode rejection, output low	V_{CM} = 50 V_{P-P}, R_L = 1.0 kΩ, I_F = 10 mA	CM_L	-	5000	-	V/μs

SAFETY AND INSULATION RATINGS				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Climatic classification	According to IEC 68 part 1		55 / 100 / 21	
Comparative tracking index		CTI	175	
Maximum rated withstanding isolation voltage	t = 1 min	V_{ISO}	4420	V_{RMS}
Isolation test voltage	t = 1.0 s	V_{ISO}	5300	V_{RMS}
Maximum transient isolation voltage		V_{IOTM}	10 000	V_{peak}
Maximum repetitive peak isolation voltage		V_{IORM}	890	V_{peak}
Isolation resistance	V_{IO} = 500 V, T_{amb} = 25 °C	R_{IO}	$\geq 10^{12}$	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C	R_{IO}	$\geq 10^{11}$	Ω
Output safety power		P_{SO}	400	mW
Input safety current		I_{SI}	275	mA
Safety temperature		T_S	175	°C
Creepage distance			≥ 7	mm
Clearance distance			≥ 7	mm
Insulation thickness		DTI	≥ 0.4	mm

Note

- As per IEC 60747-5-5, § 7.4.3.8.2, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

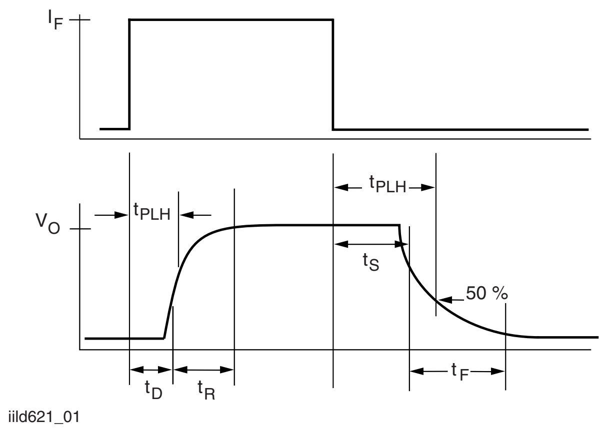


Fig. 1 - Non-Saturated Switching Timing

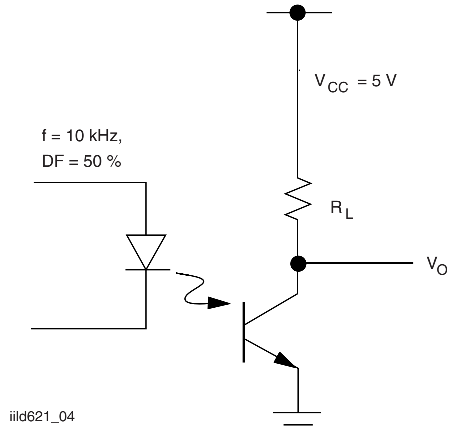


Fig. 4 - Saturated Switching Timing

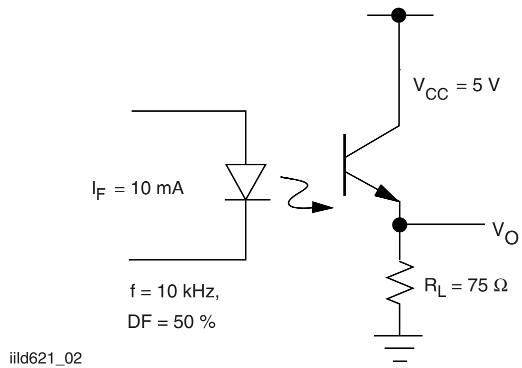


Fig. 2 - Non-Saturated Switching Timing

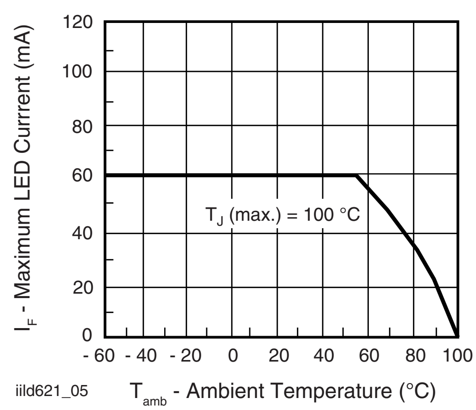


Fig. 5 - Maximum LED Current vs. Ambient Temperature

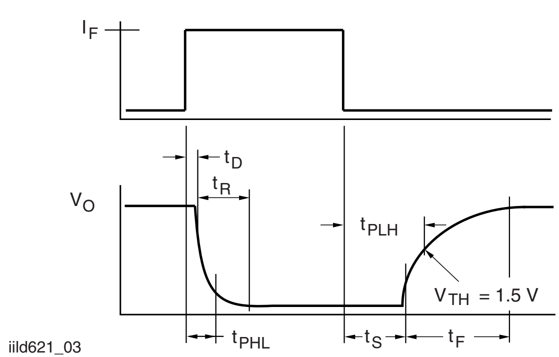


Fig. 3 - Saturated Switching Timing

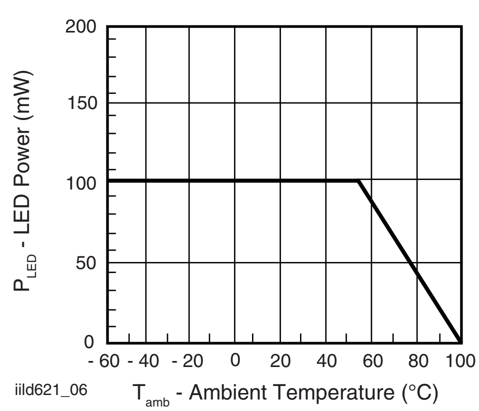


Fig. 6 - Maximum LED Power Dissipation

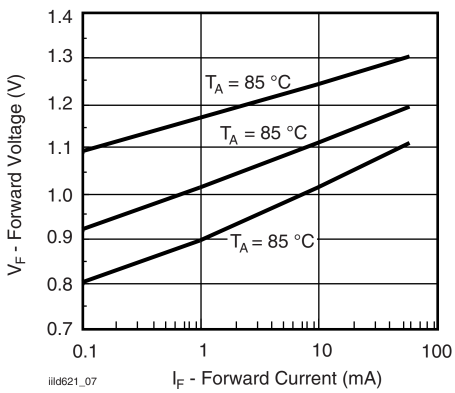


Fig. 7 - Forward Voltage vs. Forward Current

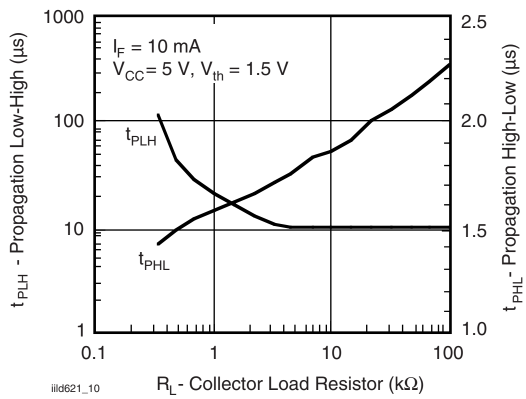


Fig. 10 - Propagation Delay vs. Collector Load Resistor

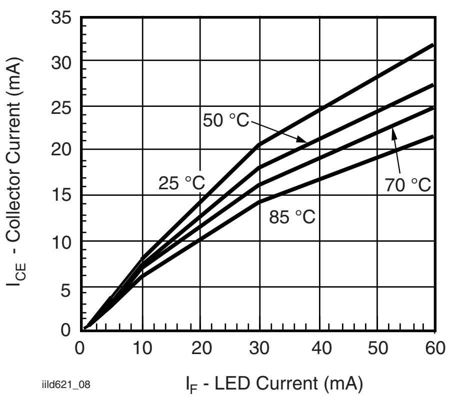


Fig. 8 - Collector Emitter Current vs. Temperature and LED Current

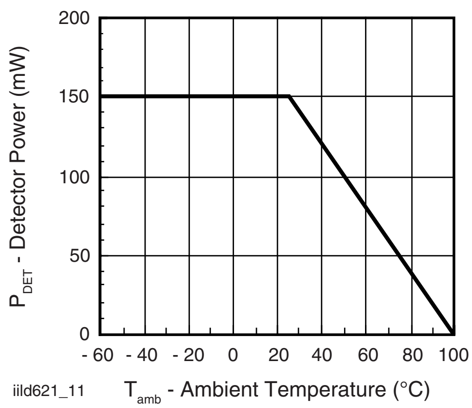


Fig. 11 - Maximum Detector Power Dissipation

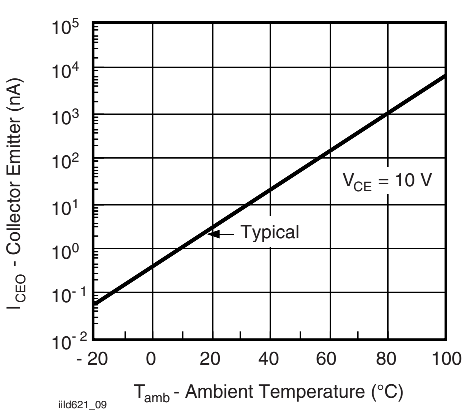


Fig. 9 - Collector Emitter Leakage vs. Temperature

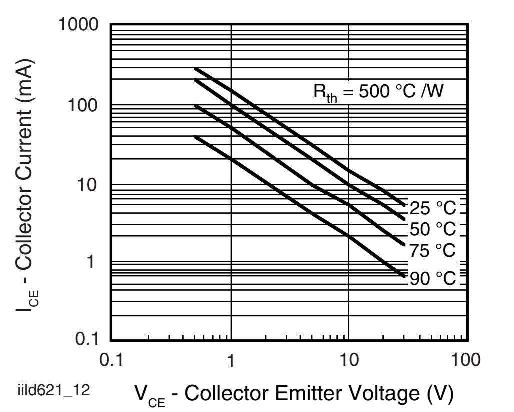


Fig. 12 - Maximum Collector Current vs. Collector Voltage

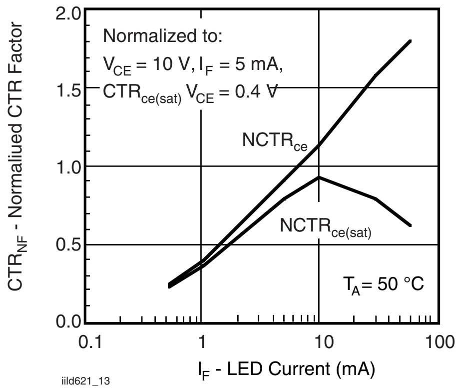


Fig. 13 - Normalization Factor for Non-Saturated and Saturated CTR vs. I_F

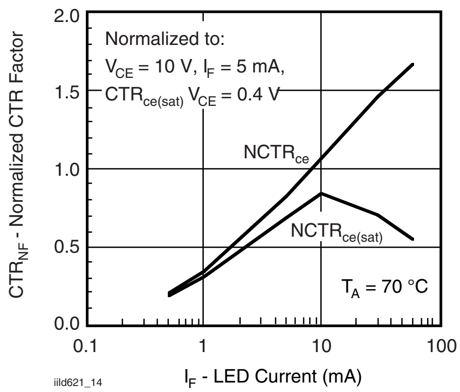


Fig. 14 - Normalization Factor for Non-Saturated and Saturated CTR vs. I_F

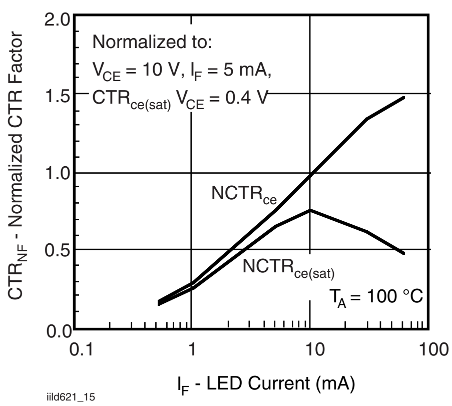
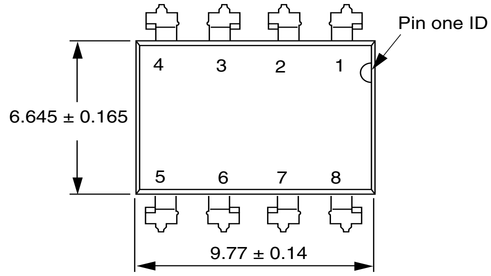
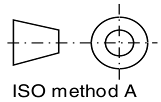
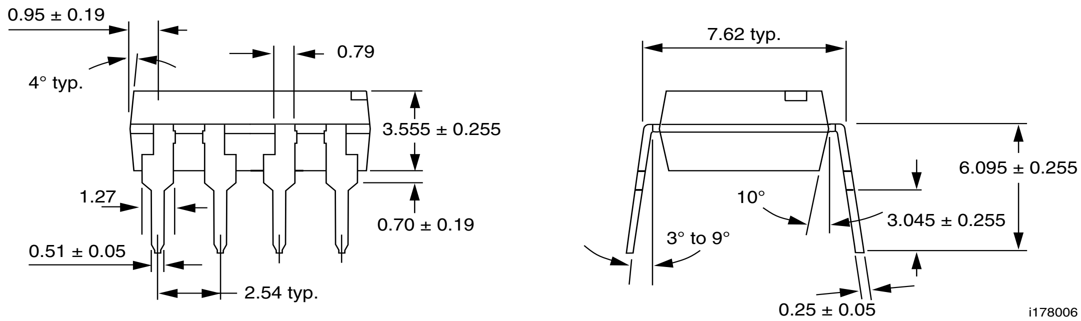


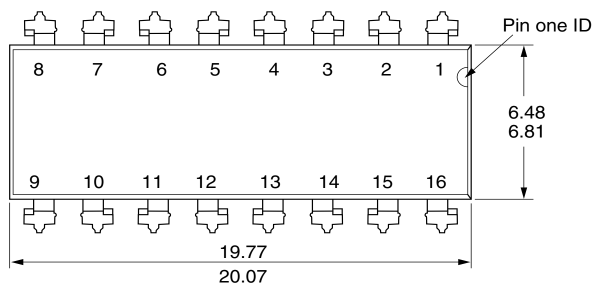
Fig. 15 - Normalization Factor for Non-Saturated and Saturated CTR vs. I_F

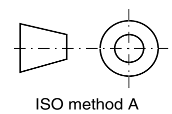
PACKAGE DIMENSIONS in millimeters

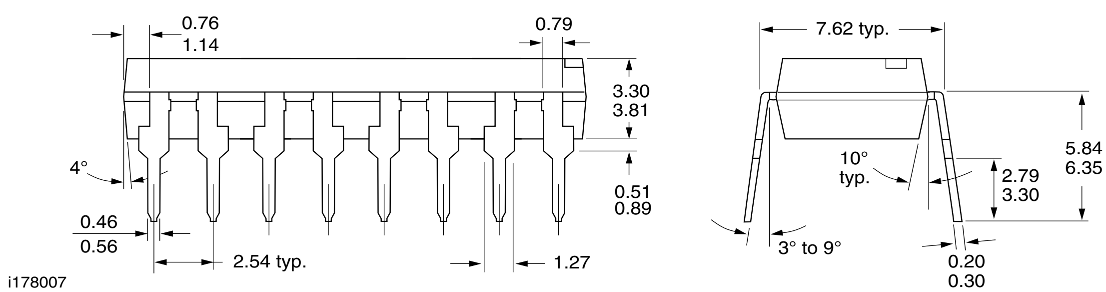


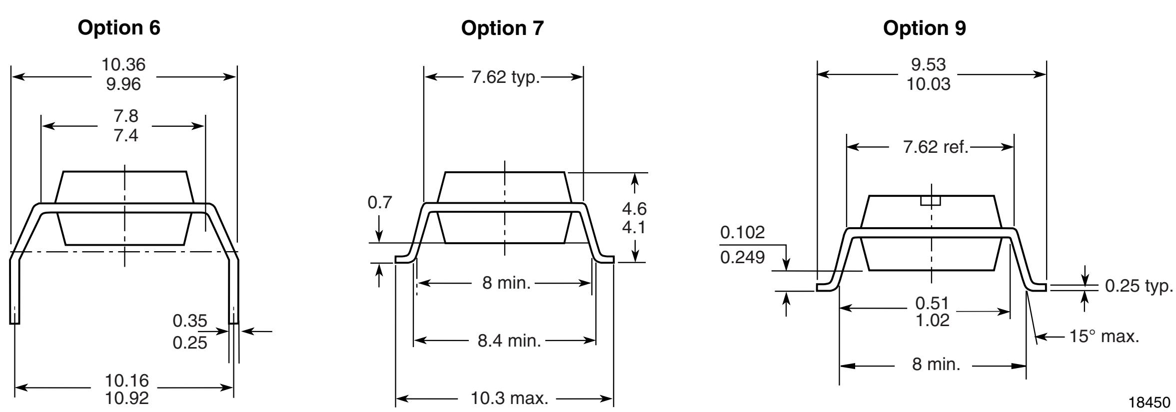




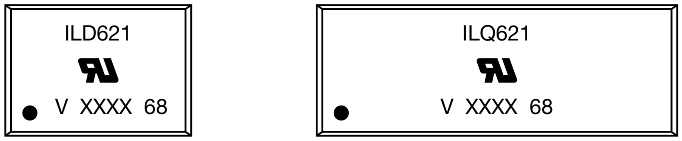








PACKAGE MARKING



Note

- XXXX = LMC (lot marking code)

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