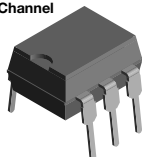
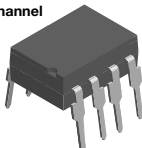


## Optocoupler, Photodarlington Output, (Single, Dual, Quad Channel)

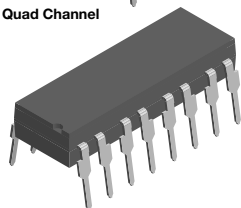
Single Channel



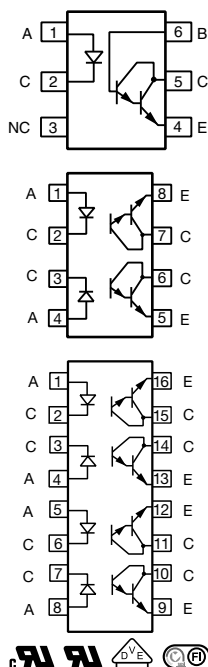
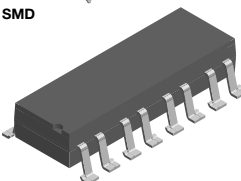
Dual Channel



Quad Channel



SMD



### DESCRIPTION

The IL30 single, ILD55 dual, and ILQ30, ILQ31, ILQ55 quad are optically coupled isolators with gallium arsenide infrared emitters and silicon photodarlington sensors. Switching can be achieved while maintaining a high degree of isolation between driving and load circuits, with no crosstalk between channels. These optocouplers can be used to replace reed and mercury relays with advantages of long life, high speed switching and elimination of magnetic fields.

The ILD55 is designed to reduce board space requirements in high density applications.

### FEATURES

- 125 mA load current rating
- Fast rise time, 10  $\mu$ s
- Fast fall time, 35  $\mu$ s
- Single, dual, and quad channel
- Solid state reliability
- Standard DIP packages
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

### LINKS TO ADDITIONAL RESOURCES



3D Models



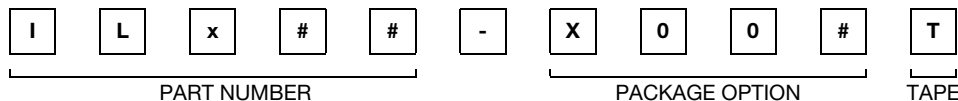
Design Tools



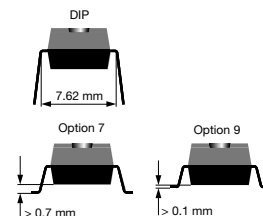
Related Documents

### AGENCY APPROVALS

- [UL 1577](#)
- [cUL](#)
- [DIN EN 60747-5-5 \(VDE 0884-5\)](#) (IL30)
- [DIN EN 60747-5-5 \(VDE 0884-5\)](#)
- [BSI](#) (IL30)
- [CQC](#)
- [FIMKO](#) (IL30)
- [FIMKO](#)

**ORDERING INFORMATION**

x = D (Dual) or Q (Quad)



AGENCY CERTIFIED / PACKAGE	SINGLE CHANNEL	DUAL CHANNEL	QUAD CHANNEL	
	CTR			
UL, cUL, FIMKO	≥ 100	≥ 100	≥ 100	≥ 200
DIP-6	IL30	-	-	-
DIP-8	-	ILD55	-	-
SMD-8, option 7	-	ILD55-X007	-	-
SMD-8, option 9	-	ILD55-X009	-	-
DIP-16	-	-	ILQ30, ILQ55	ILQ31
SMD-16, option 9	-	-	ILQ55-X009T <sup>(1)</sup>	-

**Notes**

- Additional options may be possible, please contact sales office
- <sup>(1)</sup> Also available in tubes, do not put "T" on the end

**ABSOLUTE MAXIMUM RATINGS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

PARAMETER	TEST CONDITION	PART	SYMBOL	VALUE	UNIT
<b>INPUT</b>					
Peak reverse voltage			$V_{RM}$	3	V
Forward continuous current			$I_F$	60	mA
Power dissipation			$P_{diss}$	100	mW
Derate linearly from 25 °C				1.33	mW/°C
<b>OUTPUT</b>					
Collector emitter breakdown voltage		IL30	$BV_{CEO}$	30	V
		ILQ30	$BV_{CEO}$	30	V
		ILD55	$BV_{CEO}$	55	V
		ILQ55	$BV_{CEO}$	55	V
Collector (load) current			$I_C$	125	mA
Power dissipation			$P_{diss}$	150	mW
Derate linearly from 25 °C				2	mW/°C
<b>COUPLER</b>					
Total package power dissipation		IL30	$P_{tot}$	250	mW
		ILD55	$P_{tot}$	400	mW
		ILQ30	$P_{tot}$	500	mW
		ILQ31	$P_{tot}$	500	mW
		ILQ55	$P_{tot}$	500	mW
Derate linearly from 25 °C		IL30		3.3	mW/°C
		ILD55		3.3	mW/°C
		ILQ30		6.67	mW/°C
		ILQ31		6.67	mW/°C
		ILQ55		6.67	mW/°C
Storage temperature			$T_{stg}$	-55 to +125	°C
Operating temperature			$T_{amb}$	-55 to +100	°C
Lead soldering time at 260 °C				10	s

**Note**

- 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.



<b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>						
Forward voltage	$I_F = 20\text{ mA}$	$V_F$	-	1.25	1.5	V
Reverse current	$V_R = 3\text{ V}$	$I_R$	-	0.1	10	$\mu\text{A}$
Capacitance	$V_R = 0\text{ V}$	$C_O$	-	25		pF
<b>OUTPUT</b>						
Collector emitter breakdown voltage	$I_C = 100\text{ }\mu\text{A}$	$BV_{CEO}$	30 / 55	-	-	V
Collector emitter leakage current	$V_{CE} = 10\text{ V}$ , $I_F = 0\text{ A}$	$I_{CEO}$	-	1	100	nA
Collector emitter capacitance	$V_{CE} = 10\text{ V}$ , $f = 1\text{ MHz}$	$C_{CE}$	-	3.4	-	pF
<b>COUPLER</b>						
Collector emitter saturation voltage	$I_C = 50\text{ mA}$ , $I_F = 50\text{ mA}$	$V_{CEsat}$	-	0.9	1	V
Capacitance (input to output)		$C_{IO}$	-	0.5	-	pF

**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.

<b>CURRENT TRANSFER RATIO</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
Current transfer ratio	$I_F = 10\text{ mA}$ , $V_{CE} = 5\text{ V}$	IL30	CTR	100	400	-	%
		ILD55	CTR	100	400	-	%
		ILQ30	CTR	100	400	-	%
		ILQ55	CTR	100	400	-	%
		ILQ31	CTR	200	400	-	%

<b>SWITCHING CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)						
PARAMETER	TEST CONDITION	SYMBOL	MIN.	TYP.	MAX.	UNIT
Rise time	$V_{CC} = 13.5\text{ V}$ , $I_F = 50\text{ mA}$ , $R_L = 100\text{ }\Omega$	$t_r$	-	10	-	$\mu\text{s}$
Fall time	$V_{CC} = 13.5\text{ V}$ , $I_F = 50\text{ mA}$ , $R_L = 100\text{ }\Omega$	$t_f$	-	35	-	$\mu\text{s}$

<b>SAFETY AND INSULATION RATINGS</b>				
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	$t = 1\text{ min}$	$V_{ISO}$	4420	$V_{RMS}$
Maximum transient isolation voltage		$V_{IOTM}$	10 000	$V_{peak}$
Maximum repetitive peak isolation voltage		$V_{IORM}$	890	$V_{peak}$
Isolation resistance	$V_{IO} = 500\text{ V}$ , $T_{amb} = 25\text{ }^{\circ}\text{C}$	$R_{IO}$	$\geq 10^{12}$	$\Omega$
	$V_{IO} = 500\text{ V}$ , $T_{amb} = 100\text{ }^{\circ}\text{C}$	$R_{IO}$	$\geq 10^{11}$	$\Omega$
Output safety power		$P_{SO}$	400	mW
Input safety current		$I_{SI}$	275	mA
Safety temperature		$T_S$	175	$^{\circ}\text{C}$
Creepage distance			$\geq 7$	mm
Clearance distance			$\geq 7$	mm
Insulation thickness		DTI	$\geq 0.4$	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.

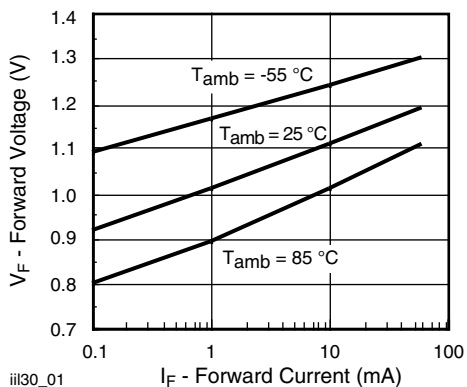
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 1 - Forward Voltage vs. Forward Current

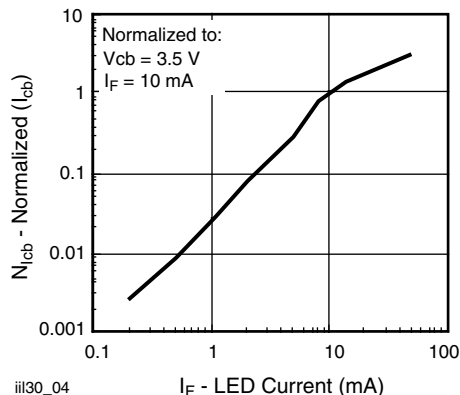


Fig. 4 - Normalized Collector Base Photocurrent vs. LED Current

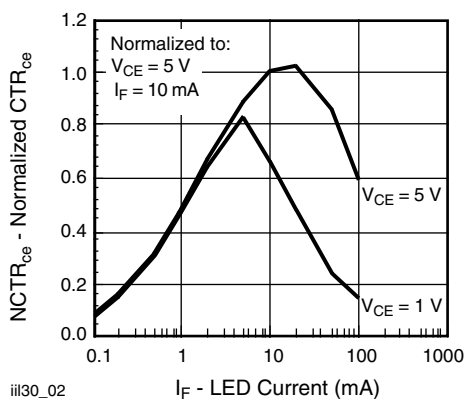
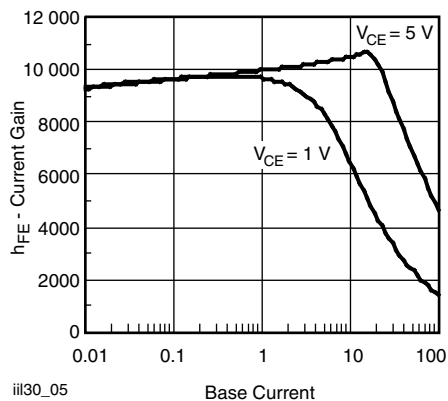
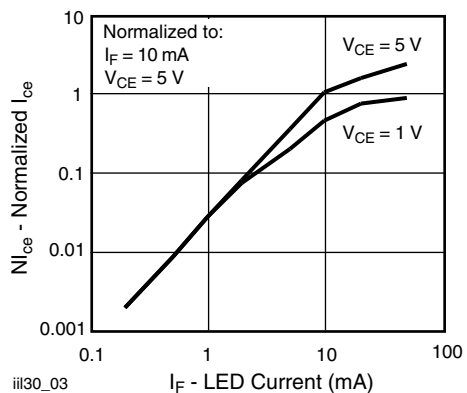

Fig. 2 - Normalized Non-Saturated and Saturated  $CTR_{CE}$  vs. LED Current

Fig. 5 -  $h_{FE}$  Current Gain vs. Base Current


Fig. 3 - Normalized Non-Saturated and Saturated Collector Emitter Current vs. LED Current

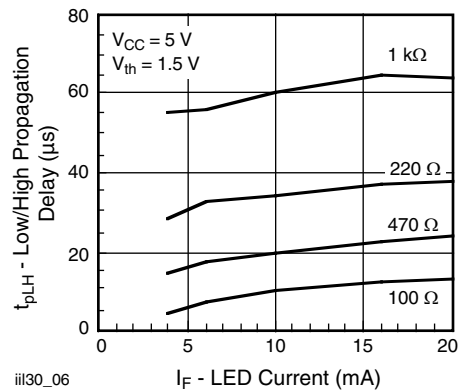


Fig. 6 - Low to High Propagation Delay vs. Collector Load Resistance and LED Current

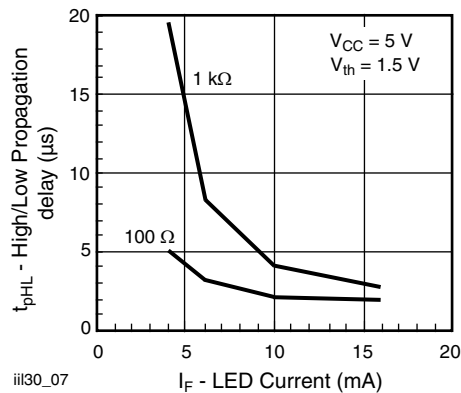


Fig. 7 - High to Low Propagation Delay vs. Collector Load Resistance and LED Current

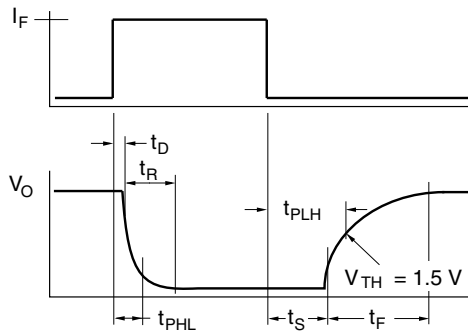


Fig. 8 - Switching Waveform

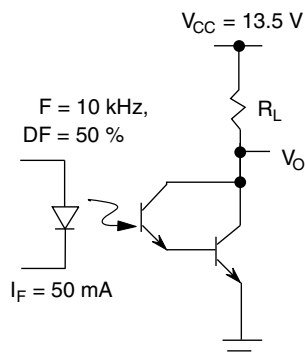
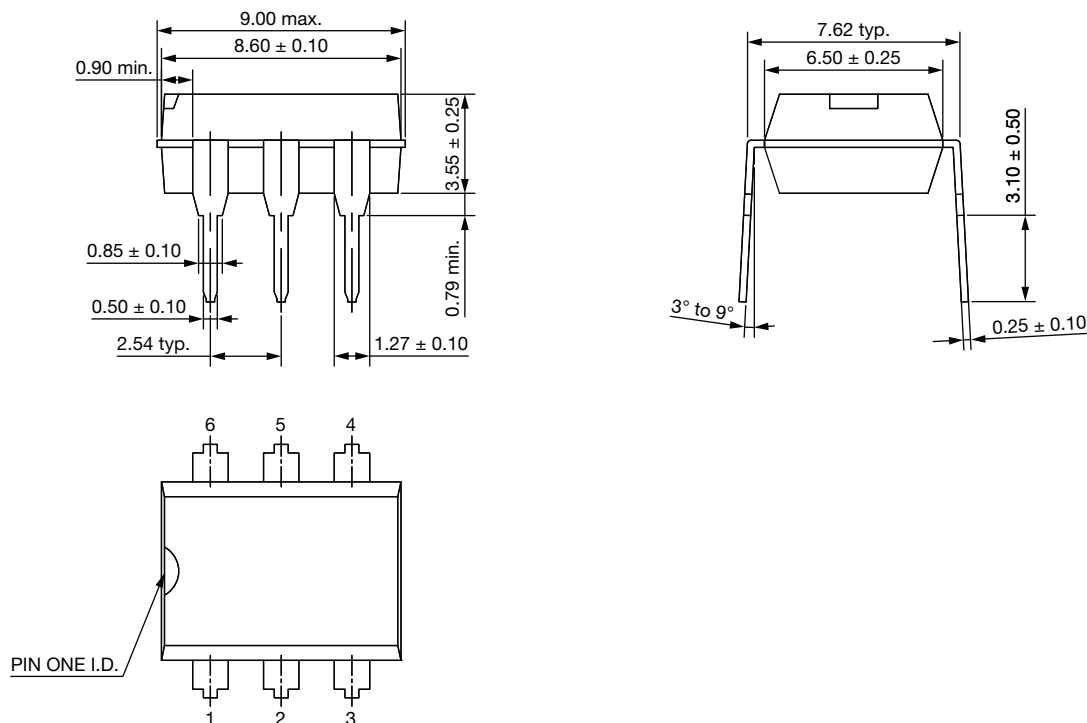


Fig. 9 - Switching Schematic

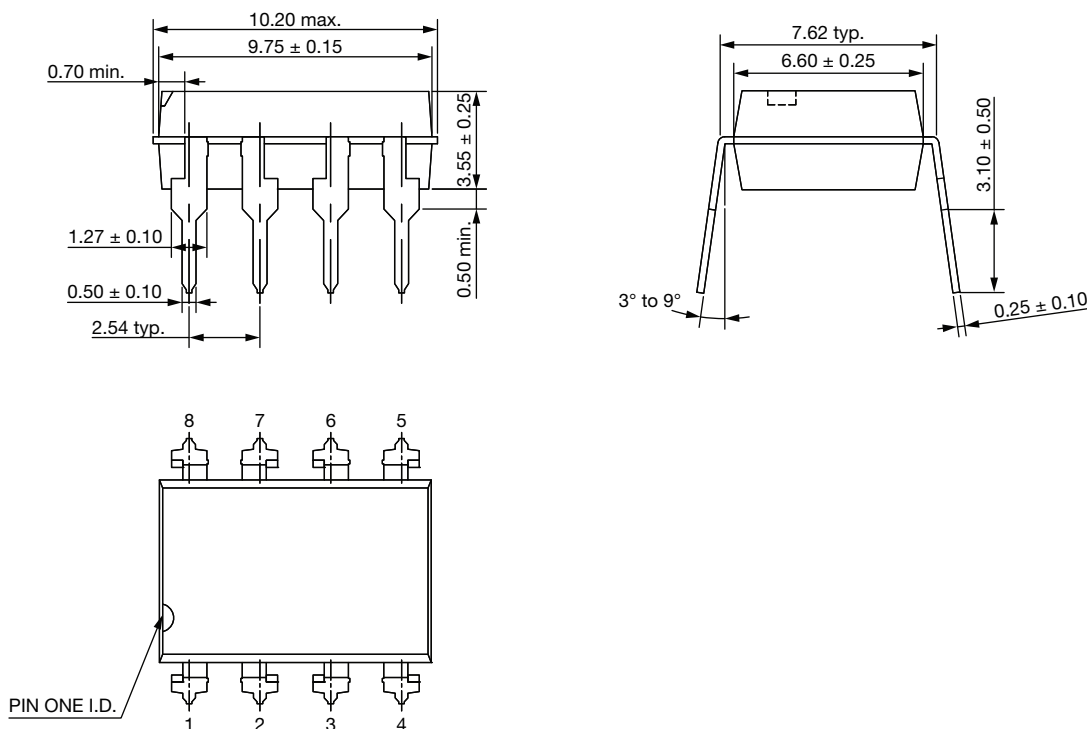


**PACKAGE DIMENSIONS** in millimeters

**DIP-6**

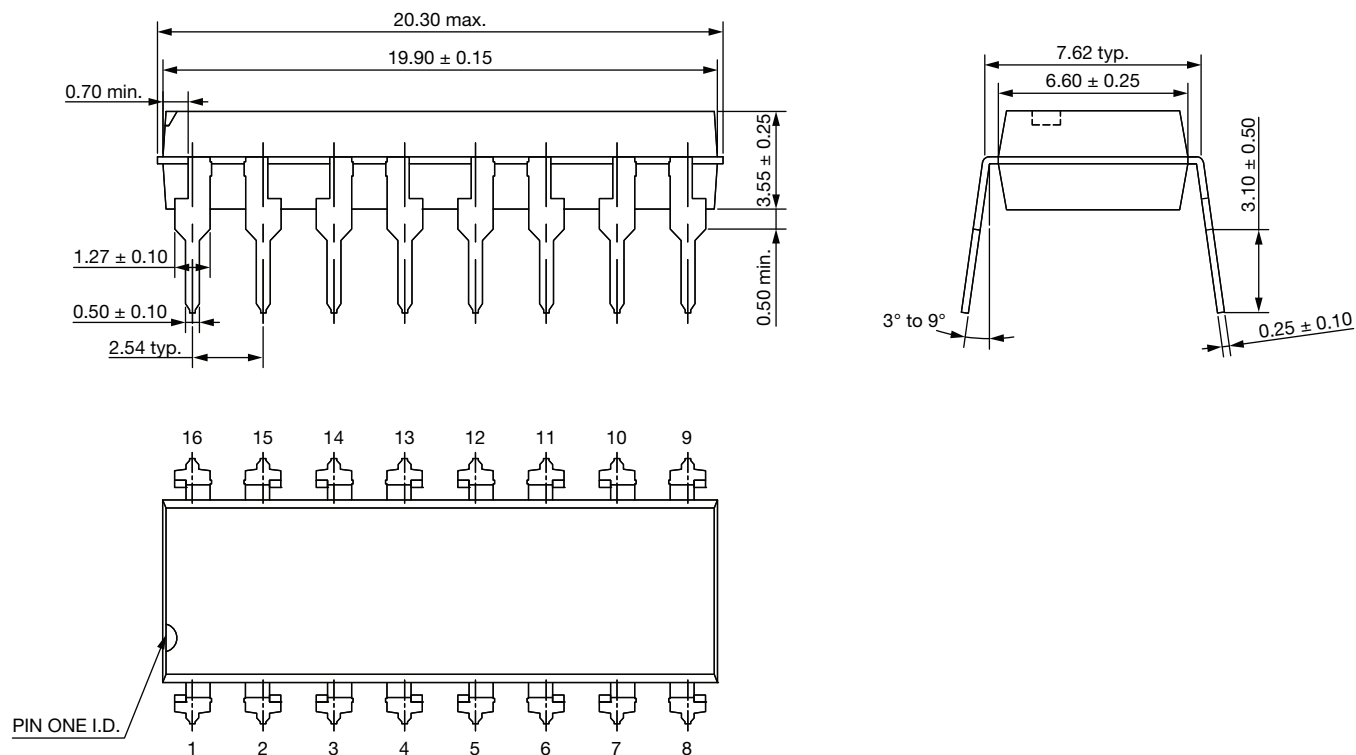


**DIP-8**

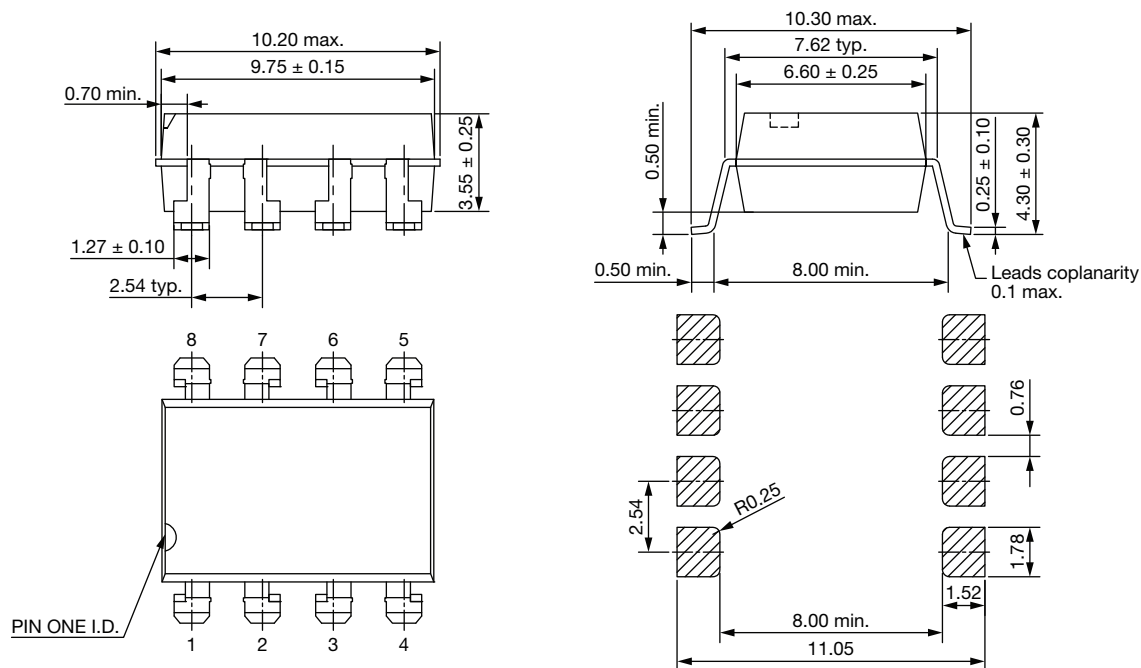




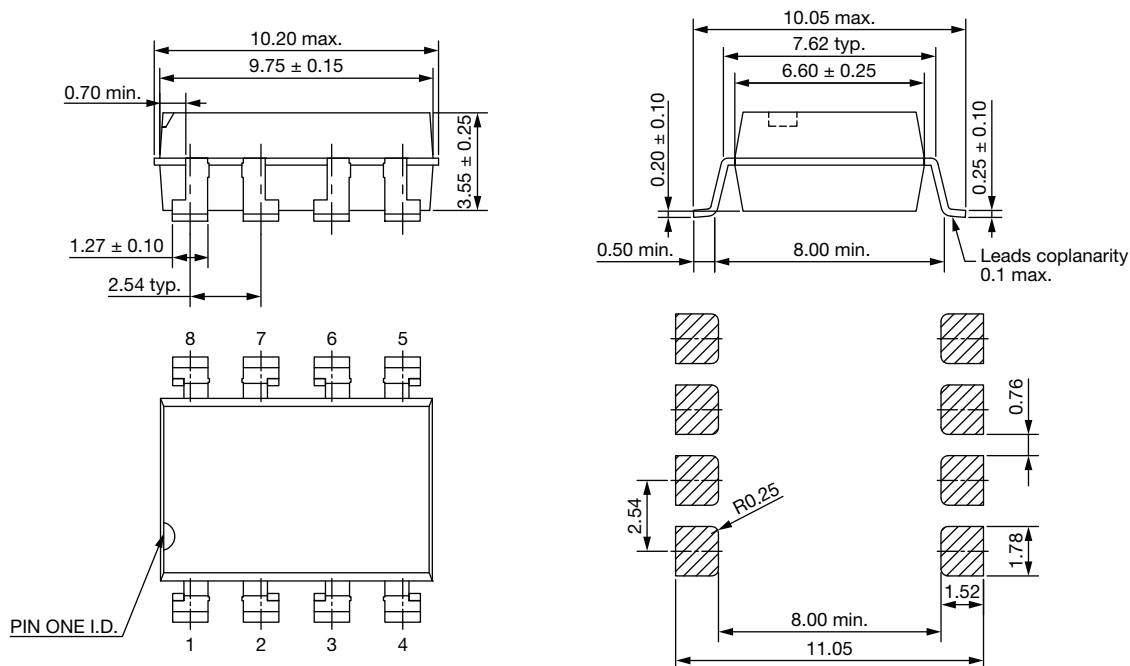
DIP-16



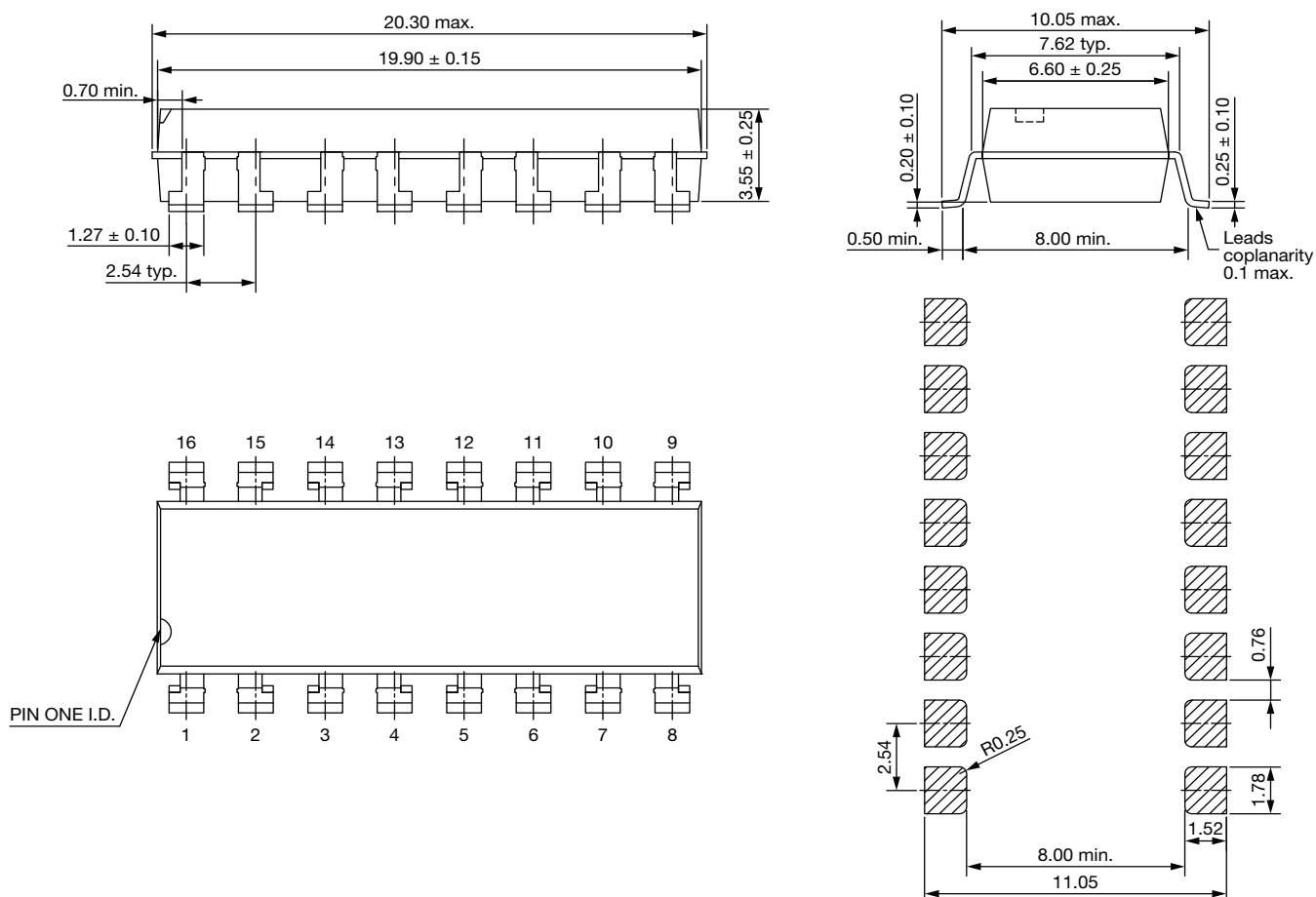
SMD-8, Option 7



### SMD-8, Option 9



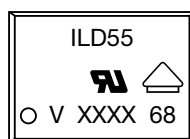
### SMD-16, Option 9







## PACKAGE MARKING (example)



### Notes

- XXXX = LMC (lot marking code)
- Only option 1 and 7 reflected in the package marking
- The VDE logo is only marked on option 1 parts
- Tape and reel suffix (T) is not part of the package marking



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