4N29, 4N30, 4N31, 4N32, 4N33

DESCRIPTION

The 4N29, 4N30, 4N31, 4N32, 4N33 series optocoupler consists of an infrared emitting diode optically coupled to an NPN silicon photodarlington transistor in a space efficient dual in line package.

FEATURES

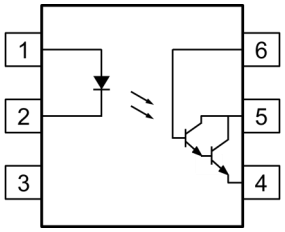
- High AC Isolation voltage 5000V_{RMS}
- High Current Transfer Ratio
- RoHS Compliant
- UL Approval E91231
- VDE Approval 40028086

APPLICATIONS

- Industrial Automation
- Industrial System Controllers
- Measuring Instruments
- Programmable Logic Controllers
- Smart meters
- Power supply feedback control

ORDER INFORMATION

- Add suffix 'X' for VDE Approval
- Add G after PN for 10mm lead spacing
- Add SM after PN for Surface Mount
- Add SMT&R after PN for Surface Mount Tape & Reel



1 Anode
2 Cathode
3 NC
4 Emitter
5 Collector
6 Base

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

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.

Input

Forward Current	60mA
Peak Forward Current (1µs, pulse)	1A
Reverse Voltage	6V
Power dissipation	120mW
Power Dissipation Derating Factor (No Derating up to T_A = 100°C)	3.8mW/°C

Output

Collector to Emitter Voltage V_{CEO}	55V
Collector to Base Voltage V_{CBO}	55V
Emitter to Collector Voltage V_{ECO}	7V
Emitter to Base Voltage V_{EBO}	7V
Power Dissipation	150mW
Power Dissipation Derating Factor (No Derating up to T_A = 80°C)	6.5mW/°C

Total Package

Total Power Dissipation	200mW
Isolation Voltage	5000V_{RMS}
Operating Temperature	-55 to 100 °C
Storage Temperature	-55 to 125 °C
Lead Soldering Temperature (10s)	260°C

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ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

INPUT

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Forward Voltage	V_F	I_F = 10mA		1.2	1.5	V
Reverse Current	I_R	V_R = 6V			10	µA
Input Capacitance	C_{in}	V_F = 0V, f = 1MHz		50		pF

OUTPUT

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Collector-Emitter Breakdown Voltage	BV_{CEO}	I_C = 1mA, I_F = 0mA	55			V
Emitter-Collector Breakdown Voltage	BV_{CBO}	I_C = 0.1mA, I_F = 0mA	55			V
Emitter-Base Breakdown Voltage	BV_{ECO}	I_E = 0.1mA	7			V
Collector-Emitter Dark Current	I_{CEO}	V_{CE} = 10V, I_F = 0mA			100	nA

COUPLED

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector Output Current	CTR	I_F = 10mA, V_{CE} = 10V				%
		4N29, 4N30	100			
		4N31	50			
		4N32, 4N33	500			
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_F = 8mA, I_C = 2mA				V
		4N29, 4N30, 4N32, 4N33			1.0	
		4N31			1.2	
Input-Output Capacitance	C_{IO}	V_{IO} = 0V, f = 1MHz		0.8		pF

* : Typical Values at T_A = 25°

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

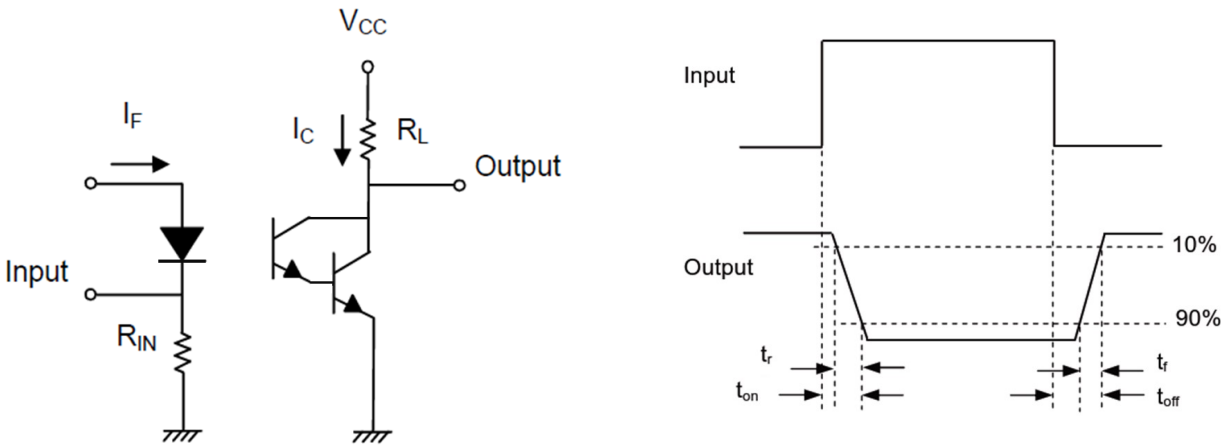
SWITCHING

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Output Turn On Time	t_{ON}	V_{CC} = 10V I_F = 200mA, I_C = 50mA			5	µs
Output Turn Off Time	t_{OFF}	V_{CC} = 10V I_F = 200mA, I_C = 50mA 4N29, 4N30, 4N31 4N32, 4N33			 40 100	µs

ISOLATION

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
Isolation Voltage	V_{ISO}	R.H. = 40% to 60%, t = 1 min Note 1	5000			V_{RMS}
Isolation Resistance	R_{IO}	V_{I-O} = 500VDC R.H. = 40% to 60% Note 1	10^{11}			Ω

Note 1 : Measured with input leads shorted together and output leads shorted together.



Switching Time Test Circuit and Waveforms

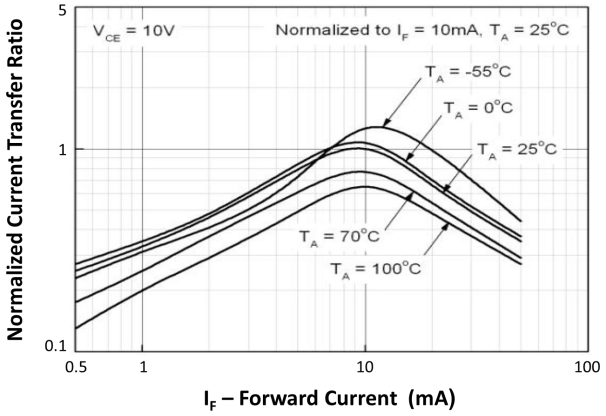


Fig 1 Normalized Current Transfer Ratio vs Forward Current

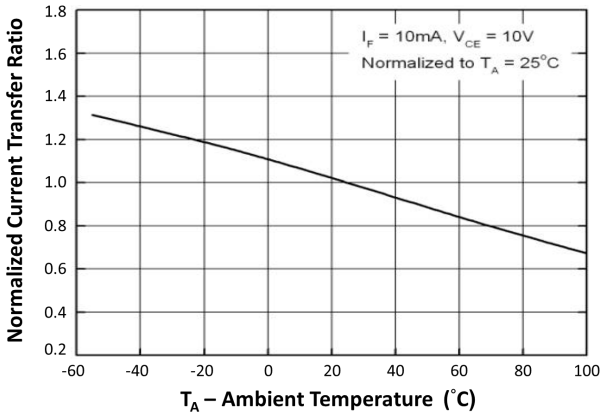


Fig 2 Normalized Current Transfer Ratio vs Ambient Temperature

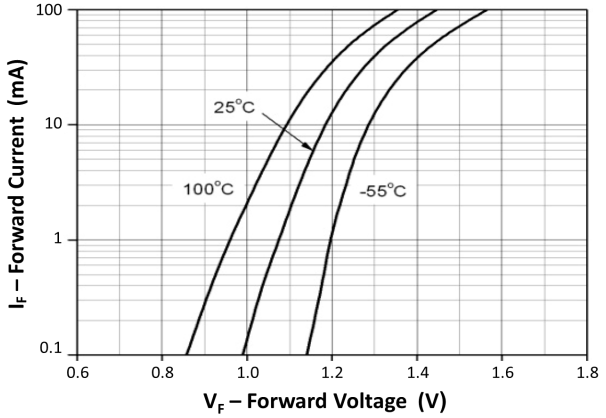


Fig 3 Forward Current vs Forward Voltage

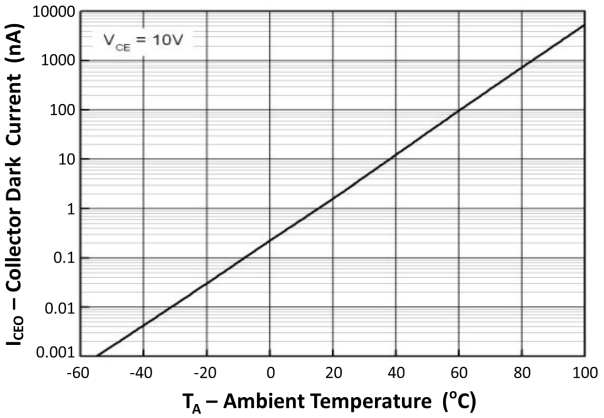


Fig 4 Collector Dark Current vs Ambient Temperature

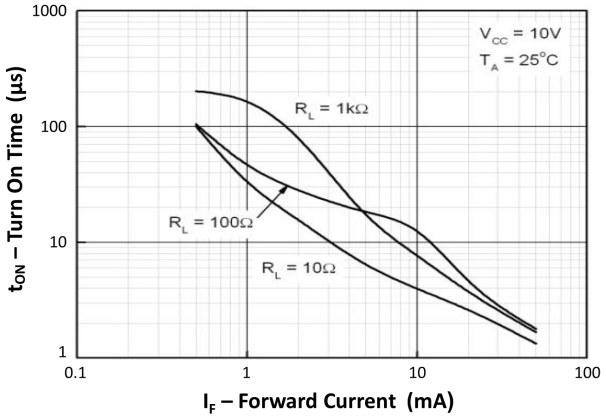


Fig 5 Turn On Time vs Forward Current

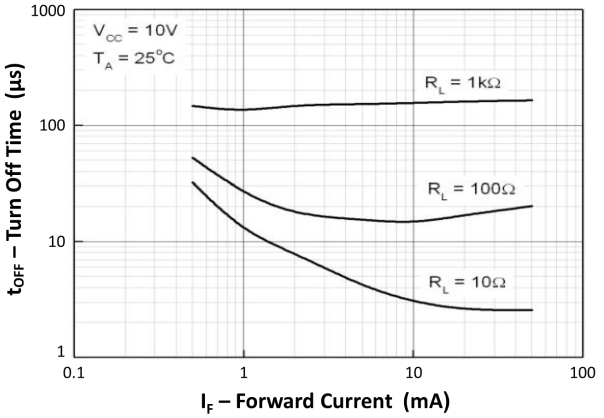


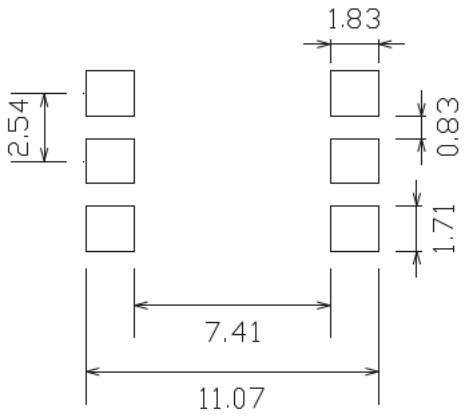
Fig 6 Turn Off Time vs Forward Current

ORDER INFORMATION

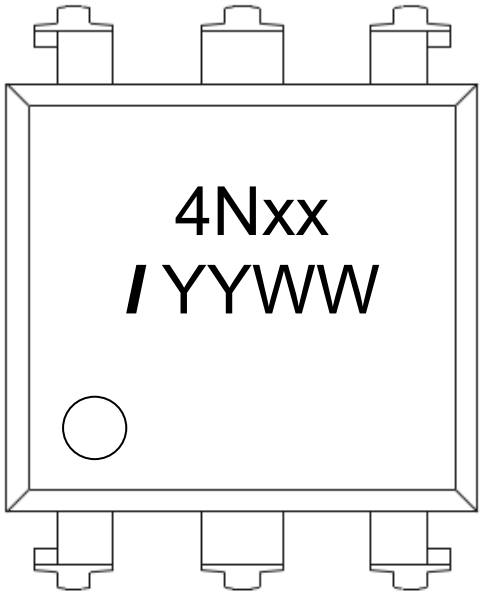
4N29, 4N30, 4N31, 4N32, 4N33 (UL Approval)			
After PN	**PN**	**Description**	**Packing quantity**
None	4N29, 4N30, 4N31, 4N32, 4N33	Standard DIP6	65 pcs per tube
G	4N29G, 4N30G, 4N31G 4N32G, 4N33G	10mm Lead Spacing	65 pcs per tube
SM	4N29SM, 4N30SM, 4N31SM 4N32SM, 4N33SM	Surface Mount	65 pcs per tube
SMT&R	4N29SMT&R, 4N30SMT&R 4N31SMT&R, 4N32SMT7R 4N33SMT7R	Surface Mount Tape and Reel	1000 pcs per reel

4N29, 4N30, 4N31, 4N32, 4N33 (UL and VDE Approvals)			
After PN	**PN**	**Description**	**Packing quantity**
None	4N29X, 4N30X, 4N31X 4N32X, 4N33X	Standard DIP6	65 pcs per tube
G	4N29XG, 4N30XG, 4N31XG 4N32XG, 4N33XG	10mm Lead Spacing	65 pcs per tube
SM	4N29XSM, 4N30XSM, 4N31XSM 4N32XSM, 4N33XSM	Surface Mount	65 pcs per tube
SMT&R	4N29XSMT&R, 4N30XSMT&R 4N31XSMT&R, 4N32XSMT&R 4N33XSMT&R	Surface Mount Tape and Reel	1000 pcs per reel

Recommended Pad Layout for SMD (mm)



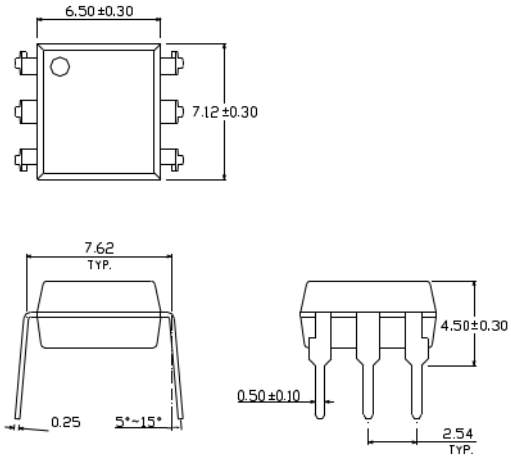
DEVICE MARKING



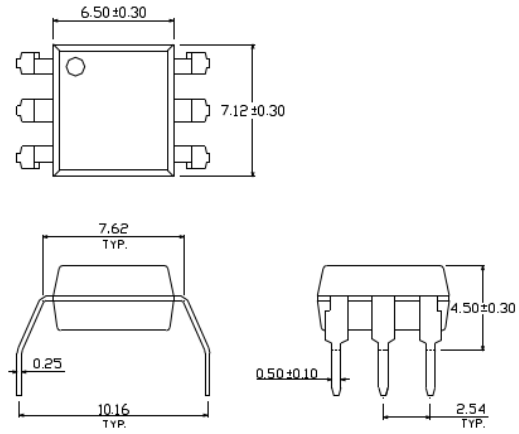
4Nxx	Device Part Number, xx = 29, 30, 31, 32, 33
I	Isocom Components 2004 Ltd.
YY	2 digit Year code
WW	2 digit Week code

PACKAGE DIMENSIONS (mm)

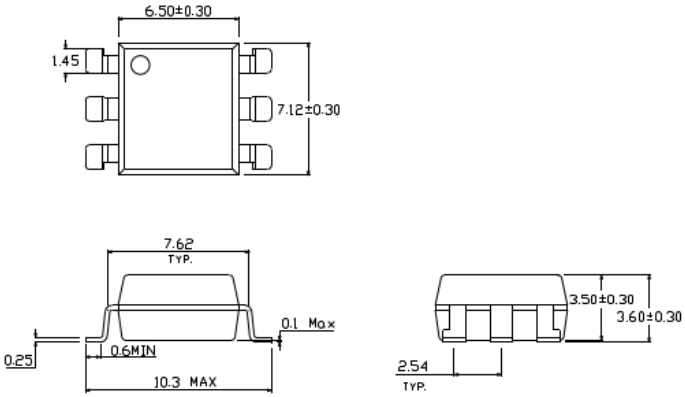
DIP



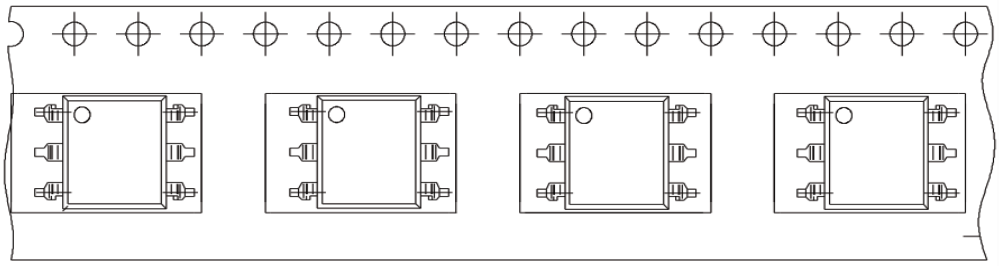
G Form



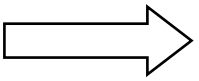
Surface Mount

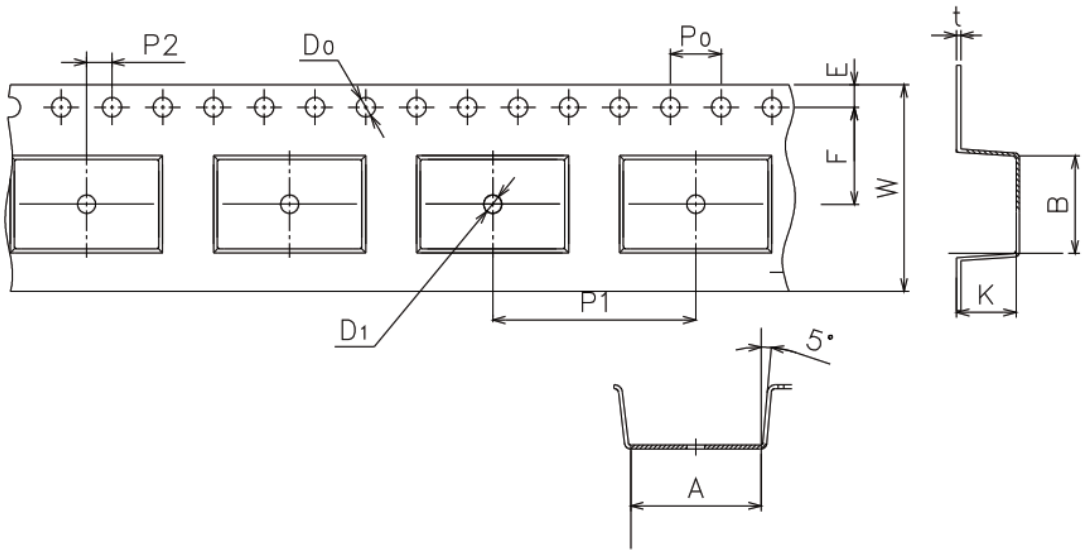


TAPE AND REEL PACKAGING



Direction of Feed from Reel

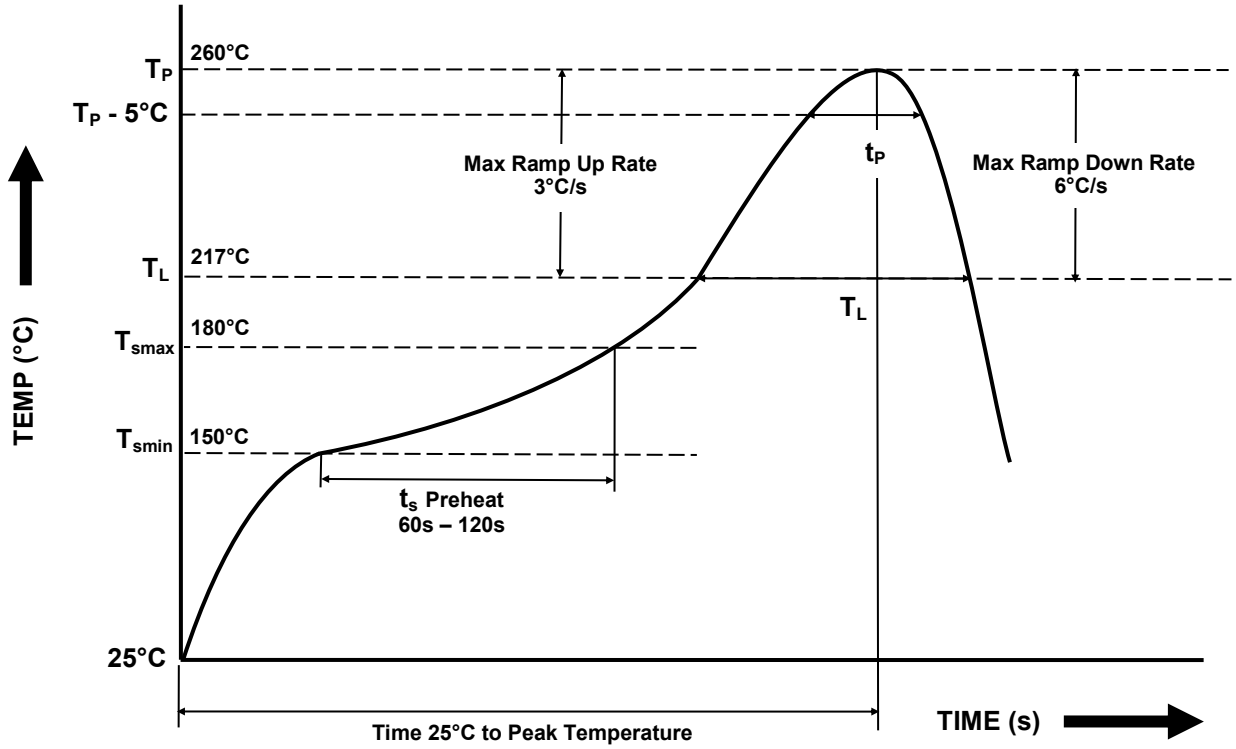




Dimension No.	A	B	D_0	D_1	E	F
Dimension(mm)	10.8±0.1	7.55±0.1	1.5±0.1	1.5+0.1/-0	1.75±0.1	7.5±0.1
Dimension No.	P_0	P1	P2	t	W	K
Dimension (mm)	4.0±0.15	12±0.1	2.0±0.1	0.35±0.03	16.0±0.2	4.5±0.1

IR REFLOW SOLDERING TEMPERATURE PROFILE

One Time Reflow Soldering is Recommended.
Do not immerse device body in solder paste.



Profile Details	Conditions
Preheat - Min Temperature (T_{SMIN}) - Max Temperature (T_{SMAX}) - Time T_{SMIN} to T_{SMAX} (t_s)	 150°C 180°C 60s - 120s
Soldering Zone - Peak Temperature (T_P) - Liquidous Temperature (T_L) - Time within 5°C of Actual Peak Temperature (T_P – 5°C) - Time maintained above T_L (t_L) - Ramp Up Rate (T_L to T_P) - Ramp Down Rate (T_P to T_L)	 260°C 217°C 20s 60s 3°C/s max 3 - 6°C/s
Average Ramp Up Rate (T_{smax} to T_P)	3°C/s max
Time 25°C to Peak Temperature	8 minutes max

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