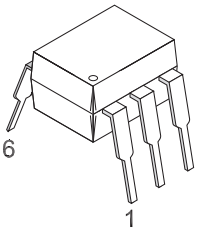
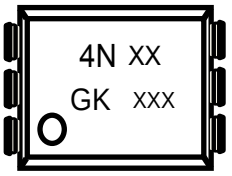
4N2X AND 4N3X Series
6 PIN DIP PHOTOTRANSISTOR PHOTOCOUPLER

General Description

The 4N2X, 4N3X series of devices each consist of an infrared emitting diode optically coupled to a phototransistor. They are packaged in a 6-pin DIP package and available in wide-lead spacing and SMD option.





SOP-6

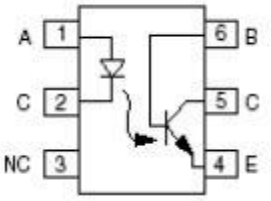
Features

- 4N2X series: 4N25, 4N26, 4N27, 4N28
- 4N3X series: 4N35, 4N36, 4N37, 4N38
- High isolation voltage between input and output (Viso=5000 V rms)
- Creepage distance >7.62 mm
- Operating temperature up to +110 °C
- Compact dual-in-line package
- The product itself will remain within RoHS compliant version
- Compliance with EU REACH

Applications

- Power supply regulators
- Digital logic inputs
- Microprocessor inputs

Schematic



Pin Configuration

1. Anode
2. Cathode
3. No Connection
4. Emitter
5. Collector
6. Base

Absolute Maximum Ratings (Ta=25℃)

Parameter		Symbol	Rating	Unit
Input	Forward current	I_F	60	mA
	Peak forward current (t = 10μs)	I_{FM}	1	A
	Reverse voltage	V_R	6	V
	Power dissipation (T_A = 25°C)	P_D	100	mW
	Derating factor (above 100°C)		3.8	mW/°C
Output	Collector-Emitter voltage	V_{CEO}	80	V
	Collector-Base voltage	V_{CBO}	80	V
	Emitter-Collector voltage	V_{ECO}	7	V
	Emitter-Base voltage	V_{EBO}	7	V
	Power dissipation (T_A = 25°C)	P_C	150	mW
	Derating factor (above 100°C)		9.0	mW/°C
Total Power Dissipation		P_{TOT}	200	mW
Isolation Voltage*1		V_{ISO}	5000	V rms
Operating Temperature		T_{OPR}	-55 to 110	°C
Storage Temperature		T_{STG}	-55 to 125	°C
Soldering Temperature*2		T_{SOL}	260	°C

Notes:

*1 AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 2 & 3 are shorted together, and pins 4, 5 & 6 are shorted together.

*2 For 10 seconds

Electro-Optical Characteristics (Ta=25℃ unless specified otherwise)

Input

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward voltage	V_F	-	1.2	1.5	V	I_F = 10mA
Reverse current	I_R	-	-	10	μA	V_R = 6V
Input capacitance	C_{in}	-	30	-	pF	V = 0, f = 1MHz

Output

Parameter		Symbol	Min	Typ.	Max.	Unit	Condition
Collector-Base dark current		I_{CBO}	-	-	20	nA	V_{CB} = 10V
Collector-Emitter dark current	4N2X	I_{CEO}	-	-	50	nA	V_{CE} = 10V, IF=0mA
	4N3X		-	-	50		V_{CE} = 60V, IF=0mA
Collector-Emitter breakdown voltage		BV_{CEO}	80	-	-	V	I_c=1mA
Collector-Base breakdown voltage		BV_{CBO}	80	-	-	V	I_C=0. 1mA
Emitter-Collector breakdown voltage		BV_{ECO}	7	-	-	V	I_E=0. 1mA
Emitter-Base breakdown voltage		BV_{EBO}	7	-	-	V	I_E=0. 1mA
Collector-Emitter capacitance		C_{CE}	-	8	-	pF	VCE=0V, f=1MHz

* Typical values at T_a = 25°C

Transfer Characteristics

Parameter		Symbol	Min	Typ.	Max.	Unit	Condition
Current Transfer ratio	4N35, 4N36, 4N37	CTR	100	-	-	%	I_F = ±10mA ,V_{CE} = 10V
	4N25, 4N26, 4N38		20	-	-		
	4N27, 4N28,		10	-	-		
Collector-Emitter saturation voltage	4N25, 4N26, 4N27, 4N28	$V_{CE(sat)}$	-	-	0.5	V	I_F = 50mA, I_c = 2mA
	4N35, 4N36, 4N37		-	-	0.3		I_F = 10mA, I_c = 0.5mA
	4N38		-	-	1.0		I_F = 20mA, I_c = 4mA
Isolation resistance		R_{IO}	10^{11}	-	-	Ω	V_{IO} = 500Vdc
Input-output capacitance		C_{IO}	-	0.2	-	pF	V_{IO} = 0, f = 1MHz
Turn-on time	4N25, 4N26, 4N27, 4N28,	Ton	-	3	10	μs	V_{CC} = 10V, I_F = 10mA, R_L = 100Ω See Fig. 11
	4N35, 4N36, 4N37, 4N38		-	10	12		V_{CC} = 10V, I_C = 2mA, R_L = 100Ω, See Fig. 11
Turn-off time	4N25, 4N26, 4N27, 4N28,	Toff	-	3	10	μs	V_{CC} = 10V, I_F = 10mA, R_L = 100Ω See Fig. 11
	4N35, 4N36, 4N37, 4N38		-	9	12		V_{CC} = 10V, I_C = 2mA, R_L = 100Ω, See Fig. 11

* Typical values at T_a = 25°C

RATING AND CHARACTERISTIC CURVES

Figure 1. Forward Current vs Forward Voltage

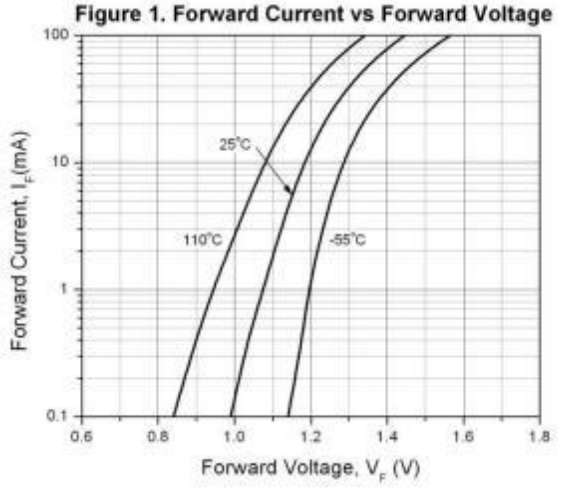


Figure 2. Current Tranfer Ratio vs Forward Current

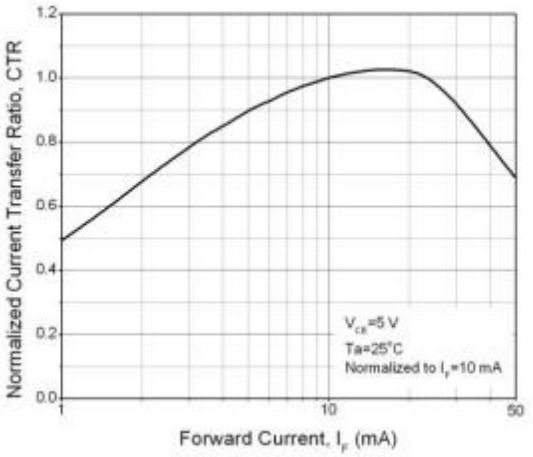


Figure 3. Current Tranfer Ratio vs Ambient Temperature

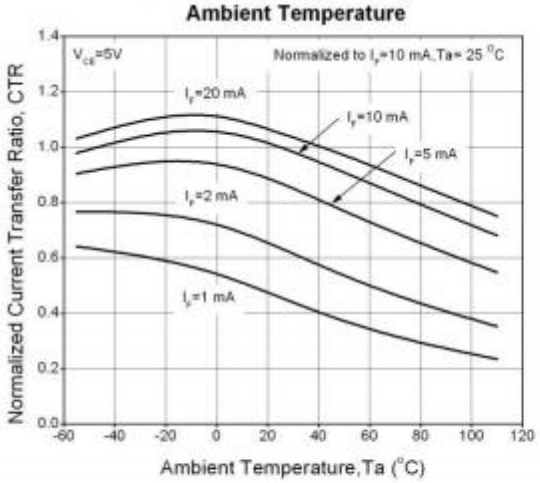


Figure 4. Current Transfer Ratio (Saturated) vs Base-Emitter Resistance

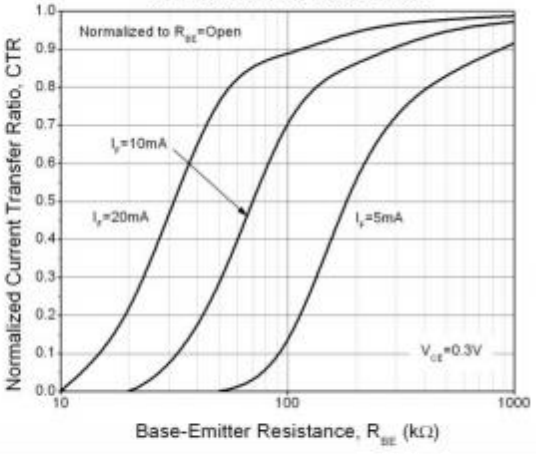


Figure 5. Current Transfer Ratio (Unsaturated) vs Base-Emitter Resistance

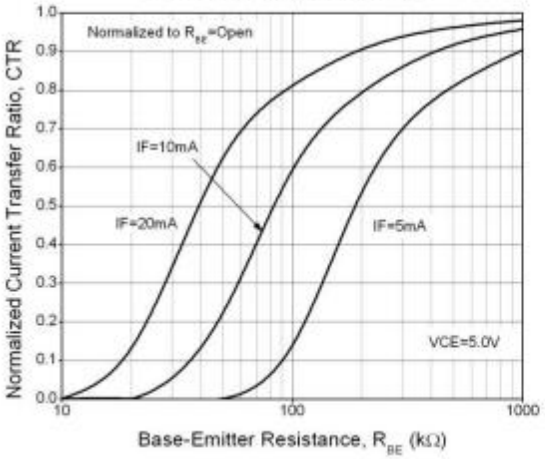
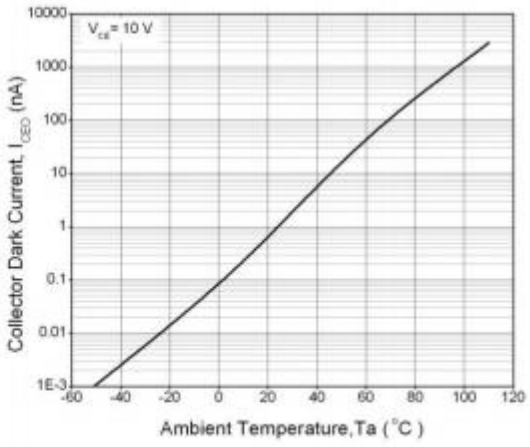
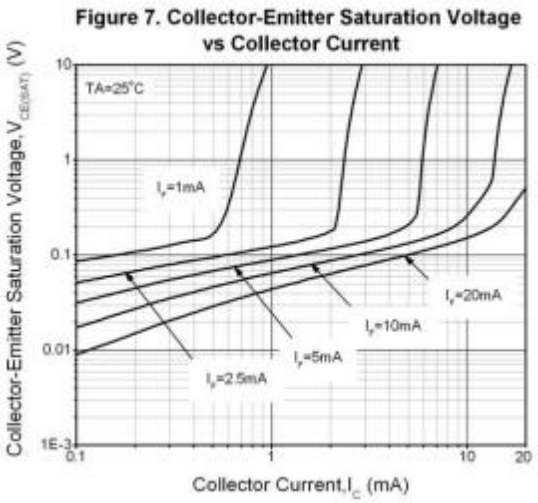
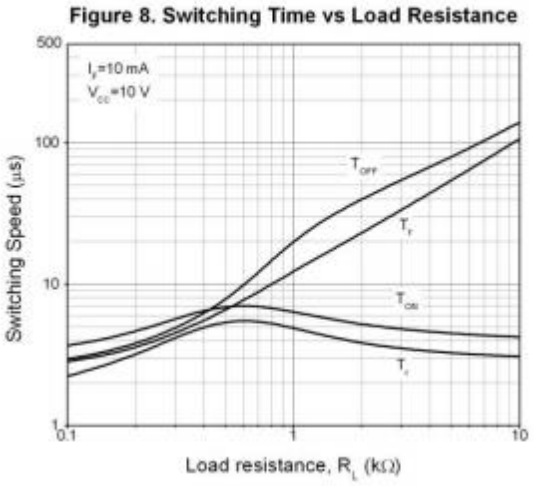


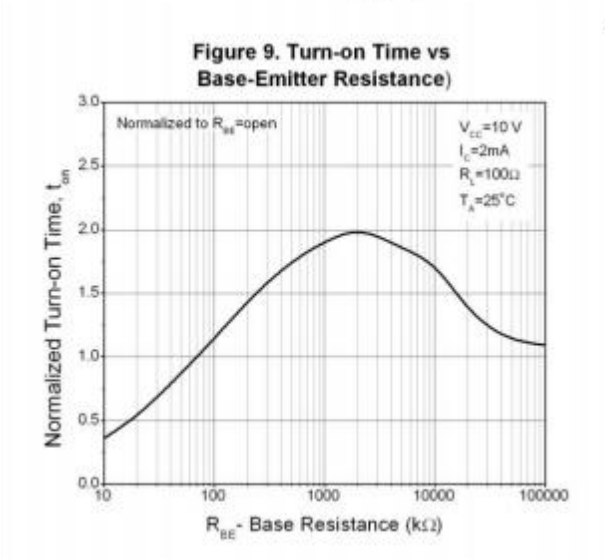
Figure 6. Dark Current vs Ambient Temperature

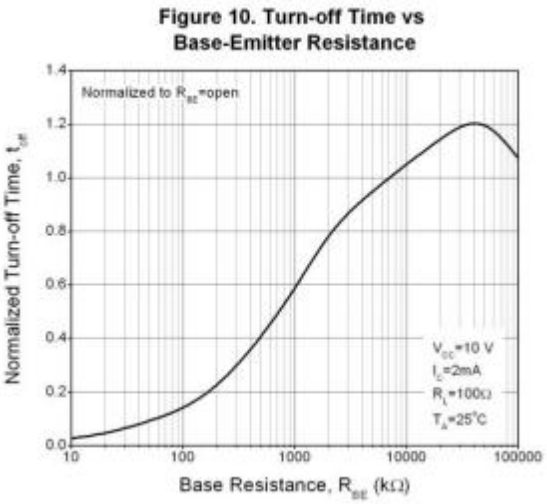


RATING AND CHARACTERISTIC CURVES









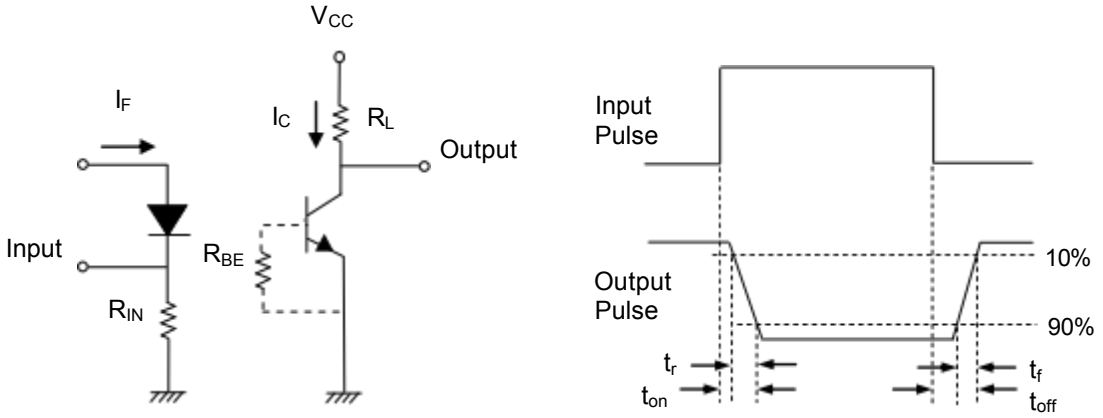
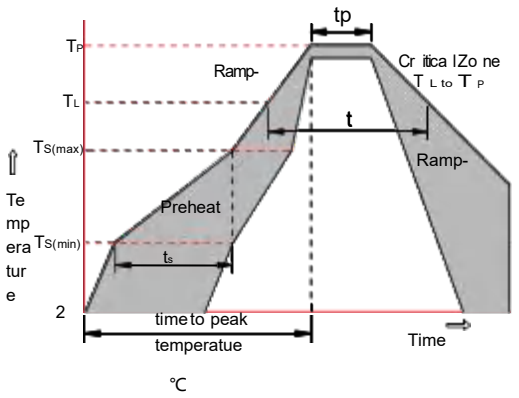


Figure 11. Switching Time Test Circuit & Waveforms

Soldering parameters

Reflow Condition		Pb-Free assembly (see as bellow)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150℃
	-Temperature Max($T_{s(max)}$)	+200℃
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3℃/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3℃/sec. Max
Reflow	-Temperature(T_L)(Liquid us)	+217℃
	-Temperature(t_L)	60-150 secs.
Peak Temp (T_p)		+260(+0/-5)℃
Time within 5℃ of actual Peak Temp (t_p)		30 secs. Max
Ramp-down Rate		6℃/sec. Max
Time 25℃ to Peak Temp (T_P)		8 min. Max
Do not exceed		+260℃

FIG5: Reflow condition



Package Dimensions & Suggested Pad Layout

DIP -6

