

Hi-Reliability Optically Coupled Isolator

3C91C, 3C92C, 3N243, 3N244, 3N245, 3N261,
3N262, 3N263 (TX, TXV)

Features:

- TO-72 hermetically sealed package
- 1 kVDC electrical isolation
- High current transfer ratio
- TX and TXV devices processed to MIL-PRF-19500



Description:

Each device is a high reliability optically coupled isolator that consists of an infrared emitting diode and a NPN silicon phototransistor which are mounted in a hermetically sealed TO-72 package. The **3C91C** and **3C92C** have a 935 nm wavelength, whereas the **3N243**, **3N244**, **3N245**, **3N261**, **3N262** and **3N263** have an 880 nm wavelength. All devices have 0.50" (12.70 mm) leads. Electrical characteristics vary. The **3N261TX**, **3N262TX** and **3N263TX** devices are similar to JEDEC registered optically coupled isolators.

TX and TXV devices are processed to OPTEK's military screening program patterned after MIL-PRF-19500.

Please refer to Application Bulletins 208 and 210 for additional design information and reliability (degradation) data.

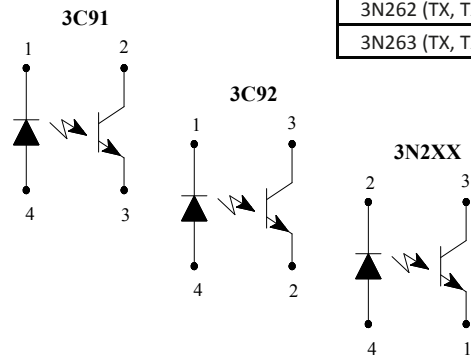
Contact your local representative or OPTEK for more information.

Applications:

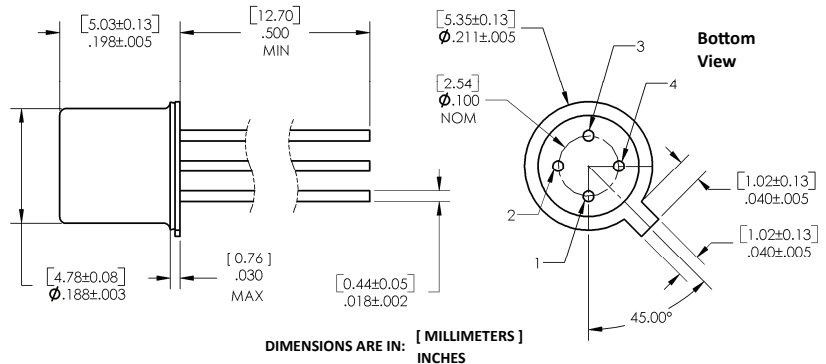
- High-voltage isolation between input and output
- Electrical isolation in dirty environments
- Industrial equipment
- Medical equipment
- Office equipment

Part Number	LED Peak Wavelength	Sensor	Isolation Voltage (,000)	CTR Min / Max	I _F (mA) Typ / Max	V _{CE} (V) Typ / Max	Lead Length
3C91C (TX, TXV)	935 nm	Transistor	1	0.3 / 2.0	10 / 50	10 / 50	0.50"
3C92C (TX, TXV)							
3N243 (TX, TXV)	0.15 / NA			3 / 40	10 / 30		
3N244 (TX, TXV)	0.3 / NA						
3N245 (TX, TXV)	0.6 / NA						
3N261 (TX, TXV)	.05 / NA			1 / 40	5 / 30		
3N262 (TX, TXV)	1.0 / 5.0						
3N263 (TX, TXV)	2.0 / 10.0						

Phototransistor Collector is connected to the Header-Base-Case for ALL versions



Pin #	3C91	3C92	3N2XX
1	Cathode	Cathode	Emitter
2	Collector	Emitter	Cathode
3	Emitter	Collector	Collector
4	Anode	Anode	Anode



General Note

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 3N262, 3N263 (TX, TXV)

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Operating Temperature Range	-55°C to $+125^\circ\text{C}$
Storage Temperature Range	-65°C to $+150^\circ\text{C}$
Input to Output Isolation Voltage	$\pm 1\text{ kVDC}^{(1)}$
Lead Soldering Temperature [1/16 inch (1.6 mm) from case for 5 seconds with soldering iron]	$260^\circ\text{C}^{(2)}$

Input Diode

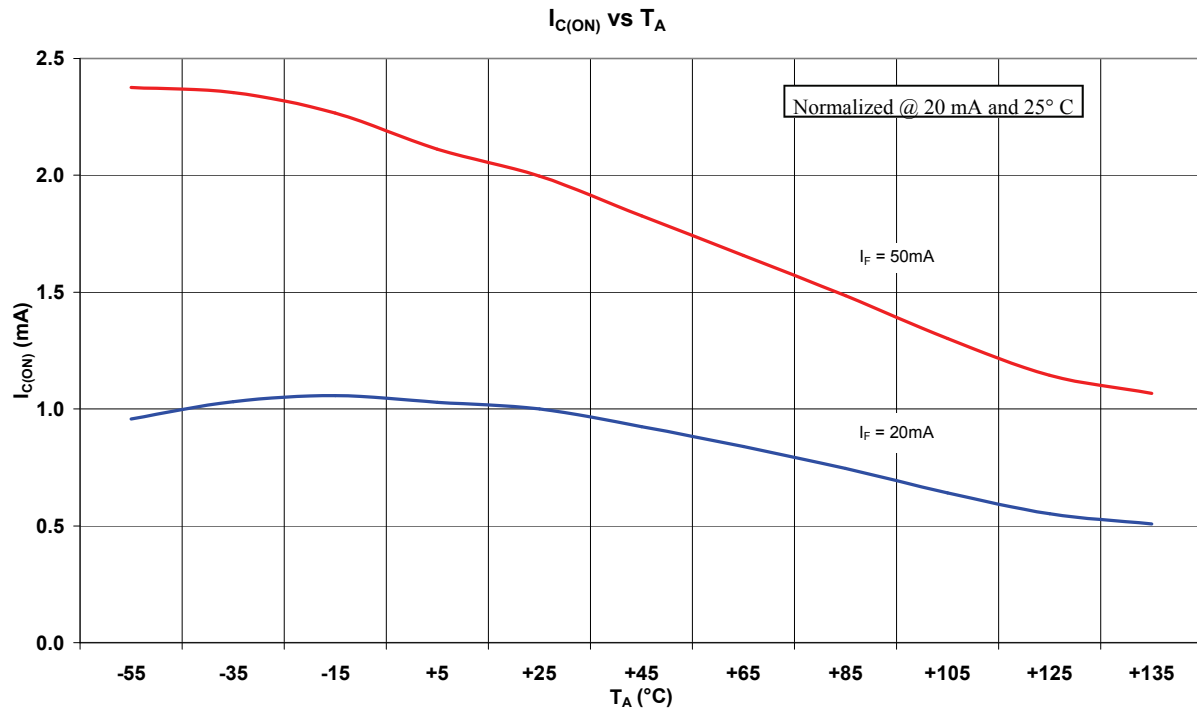
Forward DC Current	40 mA
Reverse Voltage	2.0 V
Power Dissipation	$60\text{ mW}^{(3)}$

Output Phototransistor

Continuous Collector Current	30 mA
Collector-Emitter Voltage	30 V
Emitter-Collector Voltage	5.0 V
Power Dissipation	$200\text{ mW}^{(4)}$

Notes:

1. Measured with input leads shorted together and output leads shorted together.
2. RMA flux is recommended. Duration can be extended to 10 seconds maximum when flow soldering.
3. Derate linearly $2.0\text{ mW}/^\circ\text{C}$ above 25°C .
4. Derate linearly $0.60\text{ mW}/^\circ\text{C}$ above 65°C .


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3C91C, 3C92C, 3N243, 3N244, 3N245, 3N261,
 3N262, 3N263 (TX, TXV)

Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Input Diode						
V_F	Forward Voltage					
	3C91C, 3C92C (TX, TXV)	-	-	1.2		$I_F = 2\text{ mA}$
	3C91C, 3C92C (TX, TXV)	-	-	1.5		$I_F = 50\text{ mA}$
	3N243, 3N244, 3N245 (TX, TXV)	0.8	-	1.3		$I_F = 10\text{ mA}$
	3N243, 3N244, 3N245 (TX, TXV)	1.0	-	1.5	V	$I_F = 10\text{ mA}, T_A = -55^\circ\text{C}$
	3N243, 3N244, 3N245 (TX, TXV)	0.7	-	1.2		$I_F = 10\text{ mA}, T_A = -100^\circ\text{C}$
	3N261, 3N262, 3N263 (TX, TXV)	0.8	-	1.5		$I_F = 10\text{ mA}$
	3N261, 3N262, 3N263 (TX, TXV)	1.0	-	1.7		$I_F = 10\text{ mA}, T_A = -55^\circ\text{C}$
	3N261, 3N262, 3N263 (TX, TXV)	0.7	-	1.3		$I_F = 10\text{ mA}, T_A = -100^\circ\text{C}$
V_R	Reverse Voltage 3C91C, 3C92C (TX, TXV)	7	-	-	V	$I_R = 0.1\text{ mA}$
I_R	Reverse Current					
	3C91C, 3C92C (TX, TXV)	-	-	1	μA	$V_R = 3.0\text{ V}$
	3N243, 3N244, 3N245 (TX, TXV)	-	-	100		$V_R = 2.0\text{ V}$
	3N261, 3N262, 3N263 (TX, TXV)	-	-	100		$V_R = 2.0\text{ V}$
C_{IN}	Diode Capacitance 3C91C, 3C92C (TX, TXV)	-	25	-	pF	$V = 0, f = 1\text{ MHz}$

Output Phototransistor

$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage					
	3C91C, 3C92C (TX, TXV)	50	-	-		$I_C = 10.0\text{ mA}$
	3N243, 3N244, 3N245 (TX, TXV)	30	-	-	V	$I_C = 1.0\text{ mA}$
	3N261, 3N262, 3N263 (TX, TXV)	40	-	-		$I_C = 1.0\text{ mA}$
$V_{(BR)ECO}$	Emitter-Collector Breakdown Voltage					
	3C91C, 3C92C (TX, TXV)	7	-	-		$I_C = 10\text{ }\mu\text{A}$
	3N243, 3N244, 3N245 (TX, TXV)	5	-	-	V	$I_E = 100\text{ }\mu\text{A}$
	3N261, 3N262, 3N263 (TX, TXV)	7	-	-		$I_E = 100\text{ }\mu\text{A}$
I_{CEO}	Collector Dark Current					
	3C91C, 3C92C (TX, TXV)	-	-	10	nA	$V_{CE} = 5\text{ V}$
	3C91C, 3C92C (TX, TXV)	-	-	50	nA	$V_{CE} = 50\text{ V}$
	3N243, 3N244, 3N245 (TX, TXV)	-	-	100	nA	$V_{CE} = 10.0\text{ V}$
	3N243, 3N244, 3N245 (TX, TXV)	-	-	100	μA	$V_{CE} = 10.0\text{ V}, T_A = 100^\circ\text{C}$
	3N261, 3N262, 3N263 (TX, TXV)	-	-	100	μA	$V_{CE} = 10.0\text{ V}$
	3N261, 3N262, 3N263 (TX, TXV)	-	-	100	μA	$V_{CE} = 10.0\text{ V}, T_A = 100^\circ\text{C}$

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3C91C, 3C92C, 3N243, 3N244, 3N245, 3N261,
 3N262, 3N263 (TX, TXV)

Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Coupled						
$I_{C(ON)}$	On-State Collector Current					
	3C91C, 3C92C (TX, TXV)	4.0	-	-		$I_F = 10\text{ mA}$, $V_{CE} = 5\text{ V}$
	3C91C, 3C92C (TX, TXV)	3.0	-	20		$I_F = 10\text{ mA}$, $V_{CE} = 0.4\text{ V}$
	3N243 (TX, TXV)	1.5	-	-		$I_F = 10\text{ mA}$, $V_{CE} = 10.0\text{ V}$
	3N243 (TX, TXV)	0.3	-	-		$I_F = 3\text{ mA}$, $V_{CE} = 10.0\text{ V}$
	3N243 (TX, TXV)	0.5	-	-		$I_F = 10\text{ mA}$, $V_{CE} = 10.0\text{ V}$, $T_A = 55^\circ\text{ C}$
	3N243 (TX, TXV)	0.5	-	-		$I_F = 10\text{ mA}$, $V_{CE} = 10.0\text{ V}$, $T_A = 100^\circ\text{ C}$
	3N244 (TX, TXV)	3.0	-	-		$I_F = 10\text{ mA}$, $V_{CE} = 10.0\text{ V}$
	3N244 (TX, TXV)	0.8	-	-		$I_F = 3\text{ mA}$, $V_{CE} = 10.0\text{ V}$
	3N244 (TX, TXV)	1.0	-	-		$I_F = 10\text{ mA}$, $V_{CE} = 10.0\text{ V}$, $T_A = 55^\circ\text{ C}$
	3N244 (TX, TXV)	1.0	-	-		$I_F = 10\text{ mA}$, $V_{CE} = 10.0\text{ V}$, $T_A = 100^\circ\text{ C}$
	3N245 (TX, TXV)	6.0	-	-		$I_F = 10\text{ mA}$, $V_{CE} = 10.0\text{ V}$
	3N245 (TX, TXV)	1.5	-	-		$I_F = 3\text{ mA}$, $V_{CE} = 10.0\text{ V}$
	3N245 (TX, TXV)	1.5	-	-		$I_F = 10\text{ mA}$, $V_{CE} = 10.0\text{ V}$, $T_A = 55^\circ\text{ C}$
	3N245 (TX, TXV)	1.5	-	-		$I_F = 10\text{ mA}$, $V_{CE} = 10.0\text{ V}$, $T_A = 100^\circ\text{ C}$
	3N261 (TX, TXV)	0.5	-	-		$I_F = 1\text{ mA}$, $V_{CE} = 5.0\text{ V}$
	3N261 (TX, TXV)	0.7	-	-		$I_F = 2.0\text{ mA}$, $V_{CE} = 5.0\text{ V}$, $T_A = 55^\circ\text{ C}$
	3N261 (TX, TXV)	0.5	-	-		$I_F = 2.0\text{ mA}$, $V_{CE} = 5.0\text{ V}$, $T_A = 100^\circ\text{ C}$
	3N262 (TX, TXV)	1.0	-	5		$I_F = 1\text{ mA}$, $V_{CE} = 5.0\text{ V}$
	3N262 (TX, TXV)	1.4	-	-		$I_F = 2.0\text{ mA}$, $V_{CE} = 5.0\text{ V}$, $T_A = 55^\circ\text{ C}$
	3N262 (TX, TXV)	1.0	-	-		$I_F = 2.0\text{ mA}$, $V_{CE} = 5.0\text{ V}$, $T_A = 100^\circ\text{ C}$
	3N263 (TX, TXV)	2.0	-	10		$I_F = 1\text{ mA}$, $V_{CE} = 5.0\text{ V}$
	3N263 (TX, TXV)	2.8	-	-		$I_F = 2.0\text{ mA}$, $V_{CE} = 5.0\text{ V}$, $T_A = 55^\circ\text{ C}$
	3N263 (TX, TXV)	2.0	-	-		$I_F = 2.0\text{ mA}$, $V_{CE} = 5.0\text{ V}$, $T_A = 100^\circ\text{ C}$
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage					
	3C91C, 3C92C (TX, TXV)	-	-	0.4		$I_F = 50\text{ mA}$, $I_C = 10\text{ mA}$
	3N243, 3N244, 3N245 (TX, TXV)	-	-	0.3		$I_F = 20\text{ mA}$, $I_C = 1.50\text{ mA}$
	3N243, 3N244, 3N245 (TX, TXV)	-	-	0.3		$I_F = 20\text{ mA}$, $I_C = 3.0\text{ mA}$
	3N243, 3N244, 3N245 (TX, TXV) 3N261,	-	-	0.3		$I_F = 20\text{ mA}$, $I_C = 6.0\text{ mA}$
	3N262, 3N263 (TX, TXV)	-	-	0.3		$I_F = 2.0\text{ mA}$, $I_C = 0.50\text{ mA}$
	3N261, 3N262, 3N263 (TX, TXV)	-	-	0.3		$I_F = 2.0\text{ mA}$, $I_C = 1.0\text{ mA}$
t_{ON}	Turn-on Time					
	3C91C, 3C92C (TX, TXV)	-	-	9	μs	$V_{CC} = 5\text{ V}$, $I_C = 2\text{ mA}$, $R_L = 100\ \Omega$
t_{OFF}	Turn-off Time					
	3C91C, 3C92C (TX, TXV)	-	-	6	μs	$V_{CC} = 5\text{ V}$, $I_C = 2\text{ mA}$, $R_L = 100\ \Omega$

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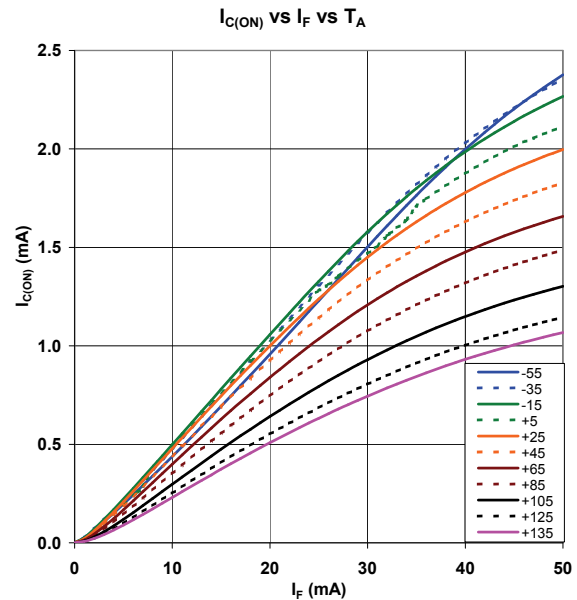
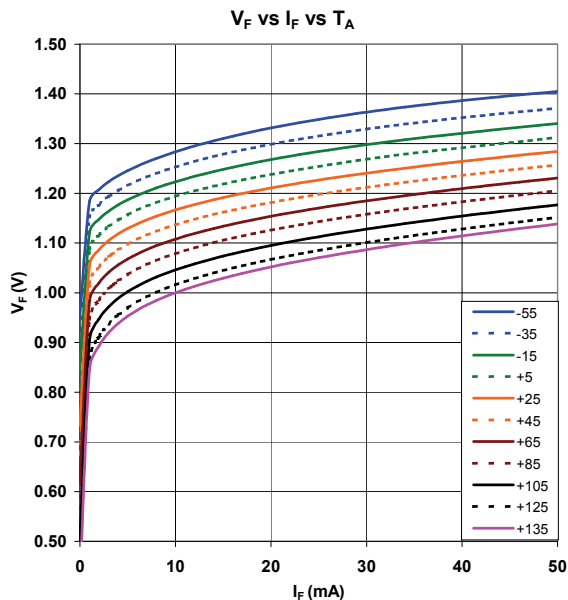
3C91C, 3C92C, 3N243, 3N244, 3N245, 3N261,
 3N262, 3N263 (TX, TXV)

Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Coupled						
C_{IO}	Input-to-Output Capacitance 3C91C, 3C92C (TX, TXV) 3N243, 3N244, 3N245 (TX, TXV) 3N261, 3N262, 3N263 (TX, TXV)	-	2	2.5	pF	$f = 1\text{ MHz}$ $V_{IO} = 0\text{ V}, f = 1.00\text{ MHz}^{(1)}$ $V_{IO} = 0\text{ V}, f = 1.00\text{ MHz}^{(1)}$
I_{IO}	Leakage Input -to-Output 3N243, 3N244, 3N245 (TX, TXV) 3N261, 3N262, 3N263 (TX, TXV)	-	-	100	nA	$V_{IO} = \pm 1.00\text{ kVDC}^{(1)}$ $V_{IO} = \pm 1.00\text{ kVDC}^{(1)}$
R_{IO}	Isolation Resistance 3C91C, 3C92C (TX, TXV)	10^9	-	-	Ω	$V_{IO} = +1\text{ kV}$
t_r	Output Rise Time 3N243, 3N244, 3N245 (TX, TXV) 3N261, 3N262 (TX, TXV) 3N263 (TX, TXV)	-	-	10 20 25	μs	$V_{CC} = 10.0\text{ V}, I_F = 10.0\text{ mA}, R_L = 100\ \Omega^{(2)}$ $V_{CC} = 10.0\text{ V}, I_F = 5.0\text{ mA}, R_L = 100\ \Omega^{(2)}$ $V_{CC} = 10.0\text{ V}, I_F = 5.0\text{ mA}, R_L = 100\ \Omega^{(2)}$
t_f	Output Fall Time 3N243, 3N244, 3N245 (TX, TXV) 3N261, 3N262 (TX, TXV) 3N263 (TX, TXV)	-	-	10 10 25	μs	$V_{CC} = 10.0\text{ V}, I_F = 10.0\text{ mA}, R_L = 100\ \Omega^{(2)}$ $V_{CC} = 10.0\text{ V}, I_F = 5.0\text{ mA}, R_L = 100\ \Omega^{(2)}$ $V_{CC} = 10.0\text{ V}, I_F = 5.0\text{ mA}, R_L = 100\ \Omega^{(2)}$

Notes:

- Measured with input leads shorted together and output leads shorted together.
- The input waveform is supplied by a generator with the following characteristics: $Z_{OUT} = 50\ \Omega$, $t_r \leq 15\text{ ns}$, duty cycle $\sim 1\%$, pulse width $\sim 100\text{ ms}$



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