

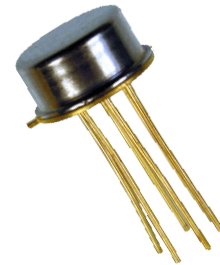


TT electronics Sensing and Control **JAN Qualification**

TT electronics Sensing and Control's Optoelectronics Business Unit (Optek Technology) is pleased to announce receiving QPL Certification of its TO-78 Metal Can Optically Coupled Isolators to JAN, JANTX and JANTXV. Qualification includes 4N22, 4N23, 4N24, 4N47, 4N48, 4N49 and their corresponding "A" versions (collector electrically isolated from the case).

Market Segments

- ✓ Defense
- ✓ Aerospace
- ✓ Hi-Rel Medical and Industrial

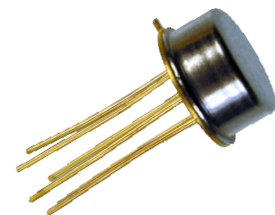


Applications

- ✓ High-Voltage Isolation
- ✓ Isolation In Dirty/Harsh Environments
- ✓ Extended Temperature Applications

Features

- ✓ TO-78 Hermetically Sealed Package
- ✓ 1kV Electrical Isolation
- ✓ JAN, JANTX, JANTXV Qualified
- ✓ -55 to +125 Degrees C



The Optek Advantage

- ✓ Manufactured Tested and Shipped from the USA
- ✓ Competitive Pricing
- ✓ Better Thermal Performance

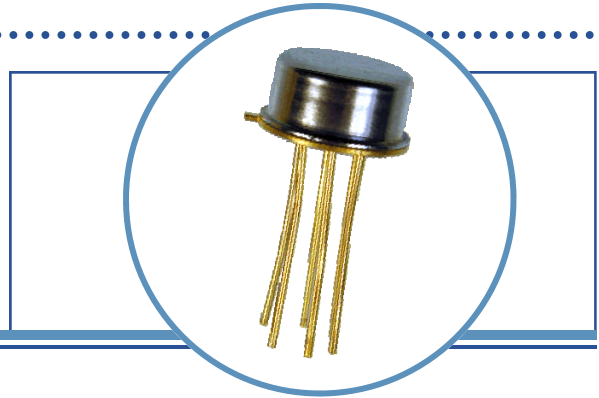
Hi-Reliability Optically Coupled Isolator

JAN / JANTX / JANTXV 4N22, 4N23, 4N24 [A]



Features:

- TO-78 hermetically sealed package
- High current transfer ratio
- 1 kV electrical isolation
- Base contact provided for conventional transistor biasing
- JAN, JANTX and JANTXV devices processed to MIL-PRF-19500
- Patent No. 4124860



Description:

Each isolator in this series consists of an infrared emitting diode and a NPN silicon phototransistor, which are mounted in a hermetically sealed TO-78 package. Devices are designed for military and/or harsh environments. The suffix letter "A" denotes the collector is electrically isolated from the case.

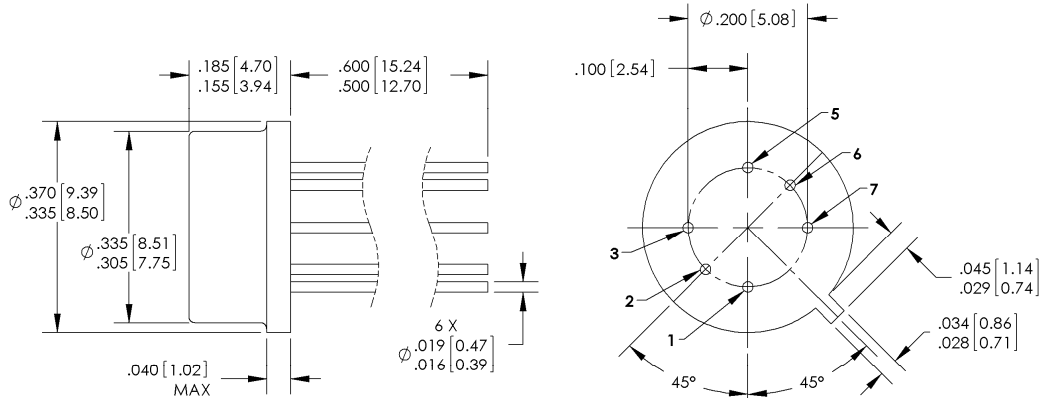
The JAN / JANTX / JANTXV 4N22, 4N22A, 4N23, 4N23A, 4N24, and 4N24A devices are processed to MIL-PRF-19500/486.

This series of 4N products are JEDEC registered, DSCC qualified.

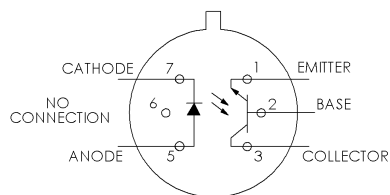
Please contact your local representative or OPTEK for more information.

Applications:

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



DIMENSIONS ARE IN INCHES [MIM]



BOTTOM VIEW

Pin #	Function	Pin #	Function
3	Collector	5	Anode
2	Base	6	Open
1	Emitter	7	Cathode

This product is built, tested and shipped from the USA

OPTEK reserves the right to make changes at any time in order to improve design and to supply the best product possible.

Hi-Reliability Optically Coupled Isolator

JAN / JANTX / JANTXV 4N22, 4N23, 4N24 [A]



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

Storage Temperature Range	-65° C to +150° C
Operating Temperature Range	-55° C to +125° C
Input-to-Output Isolation Voltage	$\pm 1.00\text{ kVDC}^{(1)}$
Lead Soldering Temperature [1/16 inch (1.6 mm) from case for 5 seconds with soldering iron]	260° C ⁽²⁾

Input Diode

Forward DC Current (65° C or below)	40 mA
Reverse Voltage	2 V
Peak Forward Current (1 μs pulse width, 300 pps)	1 A
Power Dissipation	60 mW ⁽³⁾

Output Sensor:

Continuous Collector Current	50 mA
Collector-Emitter Voltage	35 V
Collector-Base Voltage	35 V
Emitter-Base Voltage	4 V
Power Dissipation	300 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 1.0 mW/° C above 65° C.
4. Derate linearly 3.0 mW/° C above 25° C.

Ordering Information				
Part Number	Isolation Voltage (kV)	I _F (mA) Typ / Max	V _{CE} (Volts) Max	Processing MIL-PRF-195000
JAN4N22 or JAN4N22A	1	10 / 40	35	486
JANTX4N22 or JANTX4N22A				
JANTXV4N22 or JANTXV4N22A				
JAN4N23 or JAN4N23A				
JANTX4N23 or JANTX4N23A				
JANTXV4N23 or JANTXV4N23A				
JAN4N24 or JAN4N24A				
JANTX4N24 or JANTX4N24A				
JANTXV4N24 or JANTXV4N24A				

This product is built, tested and shipped from the USA



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Hi-Reliability Optically Coupled Isolator

JAN / JANTX / JANTXV 4N22, 4N23, 4N24 [A]



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

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Output Diode						
V_F	Forward Voltage	0.80 1.00 0.70	- - -	1.50 1.50 1.20	V	$I_F = 10.0\text{ mA}$ $I_F = 10.0\text{ mA}, T_A = -55^\circ\text{C}^{(1)}$ $I_F = 10.0\text{ mA}, T_A = +100^\circ\text{C}^{(1)}$
I_R	Reverse Current	-	-	100	μA	$V_R = 2.0\text{ V}$

Output Phototransistor

$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	40	-	-	V	$I_C = 1.0\text{ mA}, I_B = 0, I_F = 0$
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	45	-	-	V	$I_C = 100\ \mu\text{A}, I_B = 0, I_F = 0$
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	7	-	-	V	$I_E = 100\ \mu\text{A}, I_C = 0, I_F = 0$
$I_{C(OFF)}$	Collector-Emitter Dark Current	-	-	100 100	nA μA	$V_{CE} = 20\text{ V}, I_B = 0, I_F = 0$ $V_{CE} = 20\text{ V}, I_B = 0, I_F = 0, T_A = 100^\circ\text{C}$
$I_{CB(OFF)}$	Collector-Base Dark Current	-	-	100	nA	$V_{CB} = 20\text{ V}, I_E = 0, I_F = 0$

Coupled

$I_{C(ON)}$	On-State Collector Current JAN / JANTX / JANTXV 4N22 [A]	0.15 2.50 1.00 1.00	- - - -	- - - -	mA	$I_F = 2.0\text{ mA}, V_{CE} = 5\text{ V}, I_B = 0$ $I_F = 10.0\text{ mA}, V_{CE} = 5\text{ V}, I_B = 0$ $I_F = 10.0\text{ mA}, V_{CE} = 5\text{ V}, I_B = 0, T_A = -55^\circ\text{C}^{(1)}$ $I_F = 10.0\text{ mA}, V_{CE} = 5\text{ V}, I_B = 0, T_A = 100^\circ\text{C}^{(1)}$
	JAN / JANTX / JANTXV 4N23 [A]	0.20 6.00 2.50 2.50	- - - -	- - - -		$I_F = 2.0\text{ mA}, V_{CE} = 5\text{ V}, I_B = 0$ $I_F = 10.0\text{ mA}, V_{CE} = 5\text{ V}, I_B = 0$ $I_F = 10.0\text{ mA}, V_{CE} = 5\text{ V}, I_B = 0, T_A = -55^\circ\text{C}^{(1)}$ $I_F = 10.0\text{ mA}, V_{CE} = 5\text{ V}, I_B = 0, T_A = 100^\circ\text{C}^{(1)}$
	JAN / JANTX / JANTXV 4N24 [A]	0.40 10.0 4.00 4.00	- - - -	- - - -		$I_F = 2.0\text{ mA}, V_{CE} = 5\text{ V}, I_B = 0$ $I_F = 10.0\text{ mA}, V_{CE} = 5\text{ V}, I_B = 0$ $I_F = 10.0\text{ mA}, V_{CE} = 5\text{ V}, I_B = 0, T_A = -55^\circ\text{C}^{(1)}$ $I_F = 10.0\text{ mA}, V_{CE} = 5\text{ V}, I_B = 0, T_A = 100^\circ\text{C}^{(1)}$
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage JAN / JANTX / JANTXV 4N22 [A]	-	-	0.30	V	$I_F = 20\text{ mA}, I_C = 2.5\text{ mA}, I_B = 0$
	JAN / JANTX / JANTXV 4N23 [A]	-	-	0.30		$I_F = 20\text{ mA}, I_C = 5.0\text{ mA}, I_B = 0$
	JAN / JANTX / JANTXV 4N24 [A]	-	-	0.30		$I_F = 20\text{ mA}, I_C = 10.0\text{ mA}, I_B = 0$
H_{FE}	DC Current Gain	100	-	-	V	$V_{CE} = 5.0\text{ V}, I_C = 10.0\text{ mA}, I_F = 0\text{ mA}$
R_{IO}	Resistance (Input-to-Output)	10^{11}	-	-	Ω	$V_{IO} = \pm 1.0\text{ VDC}^{(3)}$
C_{IO}	Capacitance (Input-to-Output)	-	-	5	pF	$V_{IO} = 0\text{ V}, f = 1.0\text{ MHz}^{(3)}$
T_R, T_F	Output Rise and Fall Time	-	-	15	μs	$V_{CC} = 10.0\text{ V}, I_F = 10.0\text{ mA}, R_L = 100\text{ mA}$

Notes:

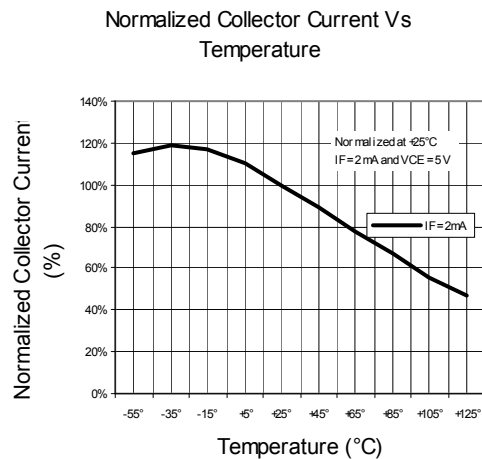
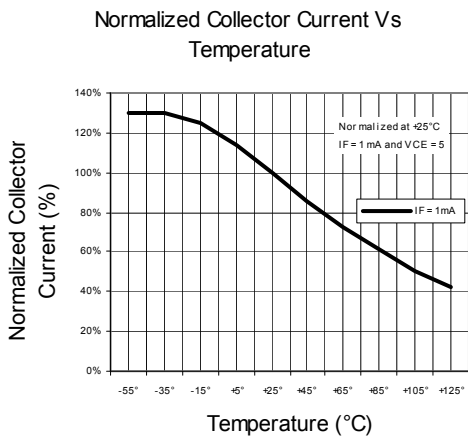
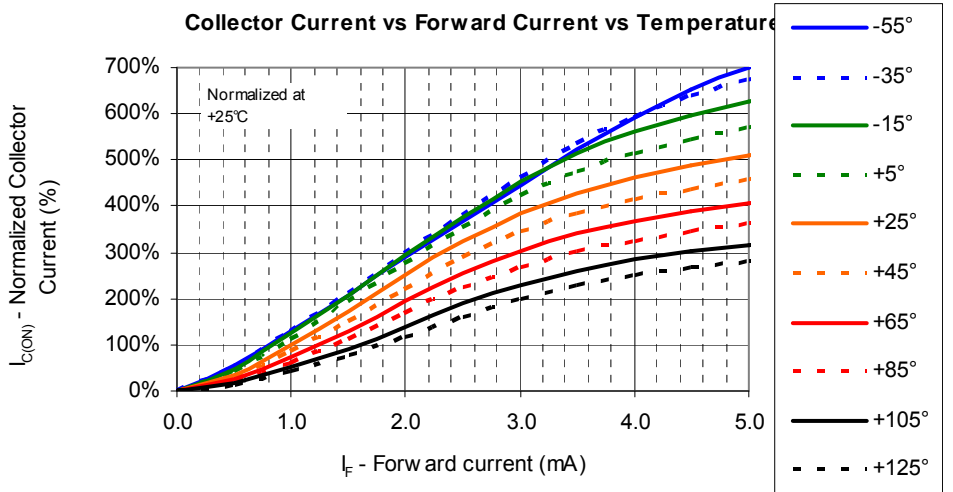
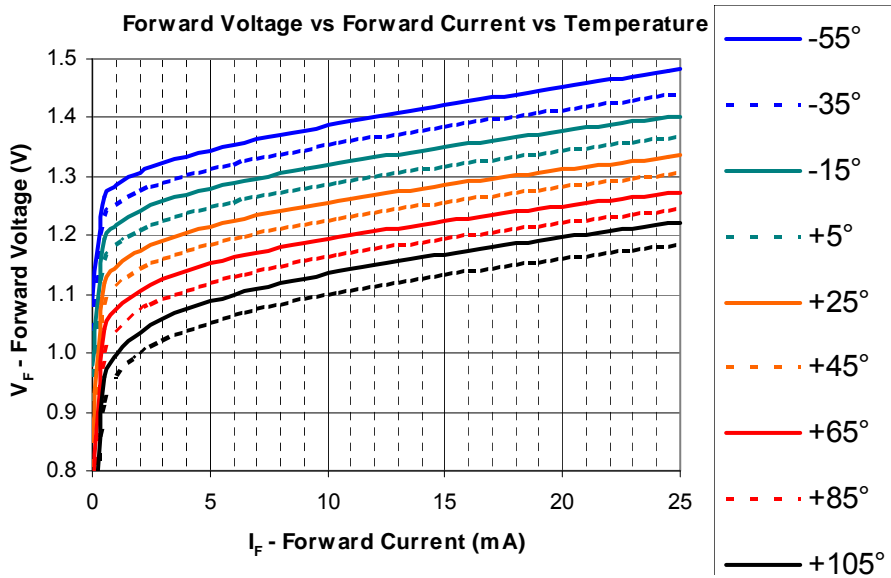
1. Guaranteed but not tested.
2. Sample tested, LTPD = 10.
3. Measured with input leads shorted together and output leads shorted together.

This product is built, tested and shipped from the USA



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Typical Performance Curves



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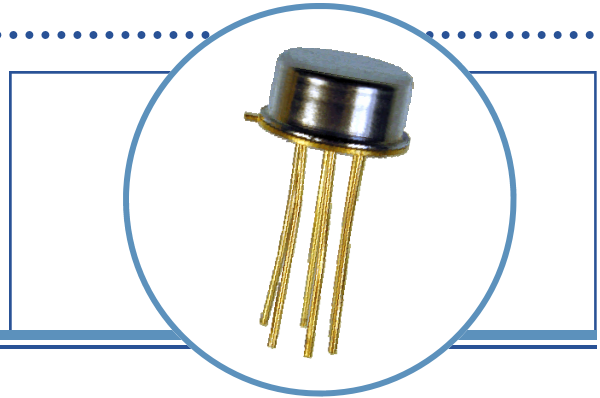
Hi-Reliability Optically Coupled Isolator

JAN / JANTX / JANTXV 4N47, 4N48, 4N49 [A]



Features:

- TO-78 hermetically sealed package
- High current transfer ratio
- 1 kV electrical isolation
- Base contact provided for conventional transistor biasing
- JAN, JANTX and JANTXV devices processed to MIL-PRF-19500
- Patent No. 4124860



Description:

Each isolator in this series consists of an infrared emitting diode and a NPN silicon phototransistor, which are mounted in a hermetically sealed TO-78 package. Devices are designed for military and/or harsh environments. The suffix letter "A" denotes the collector is electrically isolated from the case.

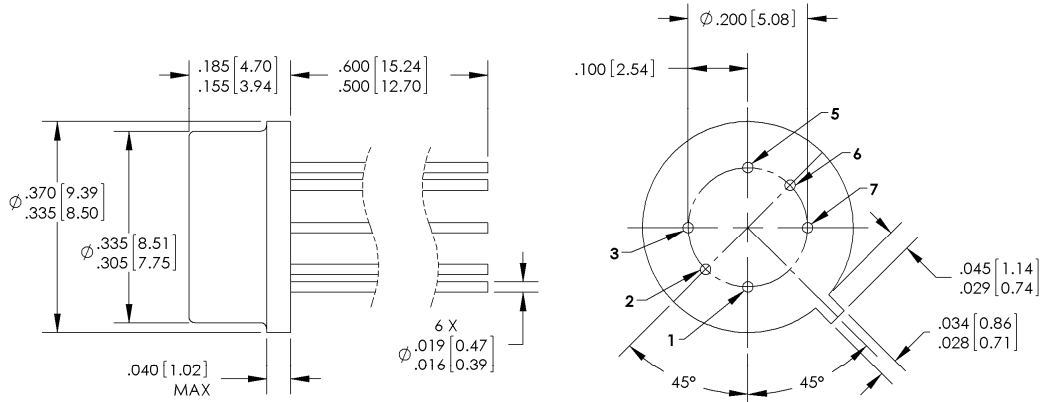
The JAN / JANTX / JANTXV 4N47, 4N47A, 4N48, 4N48A, 4N49, and 4N49A devices are processed to MIL-PRF-19500/548.

This series of 4N products are JEDEC registered, DSCC qualified.

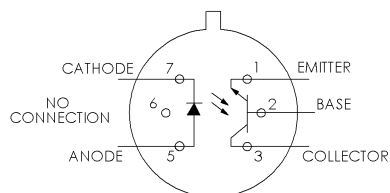
Please contact your local representative or OPTEK for more information.

Applications:

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



DIMENSIONS ARE IN INCHES [MIM]



BOTTOM VIEW

Pin #	Function	Pin #	Function
3	Collector	5	Anode
2	Base	6	Open
1	Emitter	7	Cathode

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Hi-Reliability Optically Coupled Isolator

JAN / JANTX / JANTXV 4N47, 4N48, 4N49 [A]



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

Storage Temperature Range	-55° C to +150° C
Operating Temperature Range	-55° C to +125° C
Input-to-Output Isolation Voltage	$\pm 1.00\text{ kVDC}^{(1)}$
Lead Soldering Temperature [1/16 inch (1.6 mm) from case for 5 seconds with soldering iron]	260° C ⁽²⁾

Input Diode

Forward DC Current (65° C or below)	40 mA
Reverse Voltage	2 V
Power Dissipation	60 mW ⁽³⁾


Output Phototransistor:

Continuous Collector Current	50 mA
Collector-Emitter Voltage	40 V
Collector-Base Voltage	45 V
Emitter-Base Voltage	7.0 V
Power Dissipation	300 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 1.0 mW/° C above 65° C.
4. Derate linearly 3.0 mW/° C above 25° C.

Ordering Information				
Part Number	Isolation Voltage (kV)	I _F (mA) Typ / Max	V _{CE} (Volts) Max	Processing MIL-PRF-195000
JAN4N47 or JAN4N47A	1	1 / 40	40	548
JANTX4N47 or JANTX4N47A				
JANTXV4N47 or JANTXV4N47A				
JAN4N48 or JAN4N48A				
JANTX4N48 or JANTX4N48A				
JANTXV4N48 or JANTXV4N48A				
JAN4N49 or JAN4N49A				
JANTX4N49 or JANTX4N49A				
JANTXV4N49 or JANTXV4N49A				

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Hi-Reliability Optically Coupled Isolator

JAN / JANTX / JANTXV 4N47, 4N48, 4N49 [A]



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

SYMBOL	PARAMETER	MIN	TYP	MAX	UNITS	TEST CONDITIONS
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Input Diode

V_F	Forward Voltage	0.80 1.00 0.70	- - -	1.50 1.70 1.30	V	$I_F = 10.0\text{ mA}$ $I_F = 10.0\text{ mA}, T_A = -55^\circ\text{C}^{(1)}$ $I_F = 10.0\text{ mA}, T_A = -100^\circ\text{C}^{(1)}$
I_R	Reverse Current	-	-	100	μA	$V_R = 2.0\text{ V}$

Output Phototransistor


$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage	40	-	-	V	$I_C = 1.0\text{ mA}, I_B = 0, I_F = 0$
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	45	-	-	V	$I_C = 100\ \mu\text{A}, I_B = 0, I_F = 0$
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	7	-	-	V	$I_E = 100\ \mu\text{A}, I_C = 0, I_F = 0$
$I_{C(OFF)}^1$	Collector-Emitter Dark Current	-	-	100	nA	$V_{CE} = 20\text{ V}, I_B = 0, I_F = 0$
$I_{C(OFF)}^2$	Collector-Emitter Dark Current	-	-	100	μA	$V_{CE} = 20\text{ V}, I_B = 0, I_F = 0, T_A = 100^\circ\text{C}^{(1)}$
$I_{CB(OFF)}$	Collector-Base Dark Current	-	-	10	nA	$V_{CB} = 20\text{ V}, I_E = 0, I_F = 0$

Coupled

$I_{C(ON)}$	On-State Collector Current JAN / JANTX / JANTXV 4N47 [A]	0.50 0.70 0.50	- - -	- - -	mA	$I_F = 1.0\text{ mA}, V_{CE} = 5.0\text{ V}, I_B = 0$ $I_F = 2.0\text{ mA}, V_{CE} = 5.0\text{ V}, I_B = 0, T_A = -55^\circ\text{C}^{(1)}$ $I_F = 2.0\text{ mA}, V_{CE} = 5.0\text{ V}, I_B = 0, T_A = 100^\circ\text{C}^{(1)}$
	JAN / JANTX / JANTXV 4N48 [A]	1.00 1.40 1.00	- - -	5 - -		$I_F = 1.0\text{ mA}, V_{CE} = 5.0\text{ V}, I_B = 0$ $I_F = 2.0\text{ mA}, V_{CE} = 5.0\text{ V}, I_B = 0, T_A = -55^\circ\text{C}^{(1)}$ $I_F = 2.0\text{ mA}, V_{CE} = 5.0\text{ V}, I_B = 0, T_A = 100^\circ\text{C}^{(1)}$
	JAN / JANTX / JANTXV 4N49 [A]	2.00 2.80 2.00	- - -	10 - -		$I_F = 1.0\text{ mA}, V_{CE} = 5.0\text{ V}, I_B = 0$ $I_F = 2.0\text{ mA}, V_{CE} = 5.0\text{ V}, I_B = 0, T_A = -55^\circ\text{C}^{(1)}$ $I_F = 2.0\text{ mA}, V_{CE} = 5.0\text{ V}, I_B = 0, T_A = 100^\circ\text{C}^{(1)}$
$I_{CB(ON)}$	On-State Collector Base	30	-	-	μA	$V_{CB} = 5\text{ V}, I_E = 0, I_F = 10\text{ mA}$
$V_{CE(SAT)}$	Collector-Emitter Saturation Voltage JAN / JANTX / JANTXV 4N47 [A]	-	-	0.30	V	$I_F = 2.0\text{ mA}, I_C = 0.5\text{ mA}, I_B = 0$
	JAN / JANTX / JANTXV 4N48 [A]	-	-	0.30		$I_F = 2.0\text{ mA}, I_C = 1.0\text{ mA}, I_B = 0$
	JAN / JANTX / JANTXV 4N49 [A]	-	-	0.30		$I_F = 2.0\text{ mA}, I_C = 2.0\text{ mA}, I_B = 0$
H_{FE}	DC Current Gain	100	-	-	V	$V_{CE} = 5.0\text{ V}, I_C = 10.0\text{ mA}, I_F = 0\text{ mA}$
R_{IO}	Resistance (Input-to-Output)	10^{11}	-	-	Ω	$V_{I-O} = \pm 1000\text{ VDC}^{(3)}$
C_{IO}	Capacitance (Input-to-Output)	-	-	5	pF	$V_{I-O} = 0\text{ V}, f = 1.0\text{ MHz}^{(3)}$
T_R, T_F	Rise and Fall Time	-	-	20	μs	$V_{CC} = 10.0\text{ V}, I_F = 5.0\text{ mA}, R_L = 100\ \Omega$

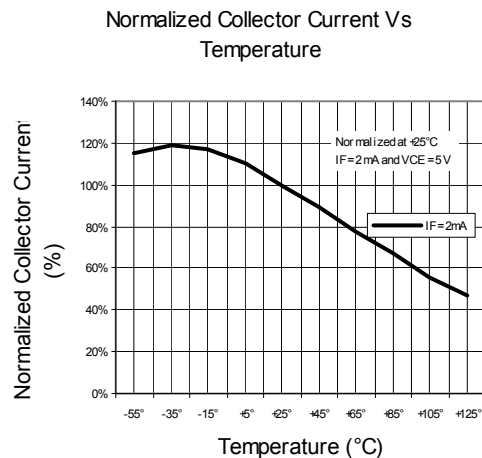
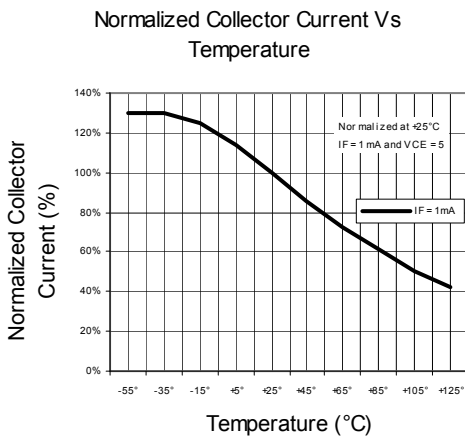
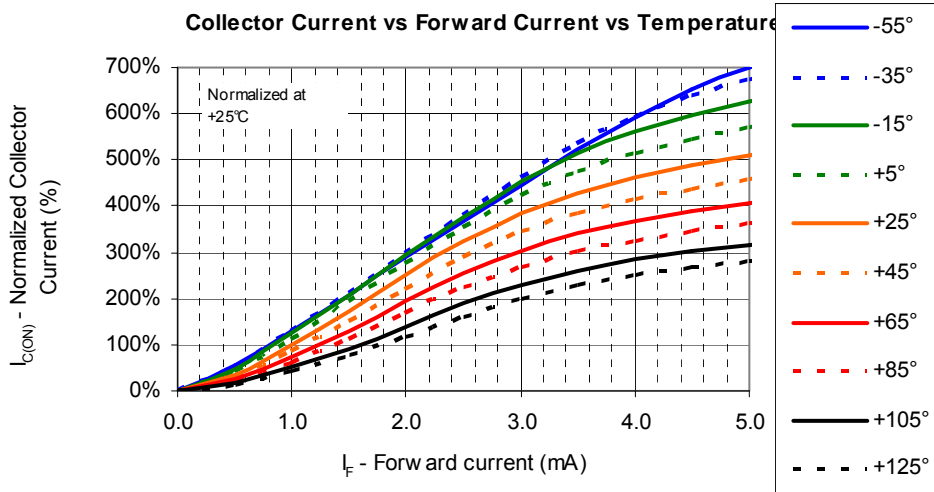
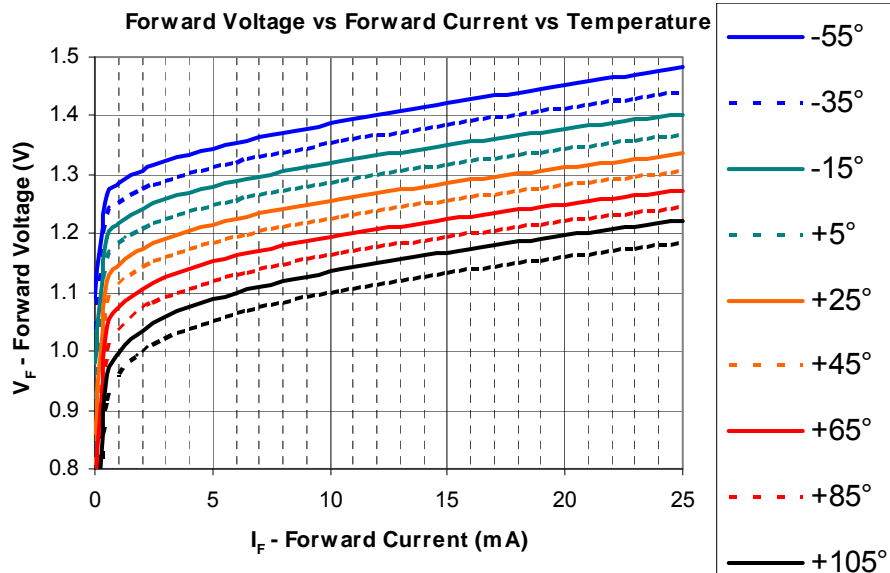
Notes:

1. Guaranteed but not tested.
2. Sample tested, LTPD = 10.
3. Measured with input leads shorted together and output leads shorted together.

This product is built, tested and shipped from the USA 

OPTEK reserves the right to make changes at any time in order to improve design and to supply the best product possible.

Typical Performance Curves



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DEFENSE LOGISTICS AGENCY
LAND AND MARITIME
POST OFFICE BOX 3990
COLUMBUS, OH 43218-3990

August 22, 2011

Mr. Rodney Bailey
Quality Assurance Director
Optek Technology Inc.
905 E. Walnut St.
Carrollton, TX 75040

Dear Mr. Bailey:

Re: JAN, JANTX, and JANTXV Manufacturer's Certification, MIL-PRF-19500P, FSC 5961; VQ (VQE-11-022892); CAGE Code: 32694

Your facility at 1645 Wallace Drive, Carrollton, Texas, was audited by Mr. Carl DelloStritto and, Mr. Alan Barone of this Center on Dec 8-10, 2010 for compliance with the Manufacturer's Certification requirements of MIL-PRF-19500P. All deficiencies found during the audit are now closed.

Compliance with these requirements has been successfully demonstrated; therefore Optek Technology Inc. is considered a certified manufacturer eligible to qualify and supply JAN, JANTX, and JANTXV optically coupled isolators and LEDs in a "TO-78 can package in accordance with the requirements of MIL-PRF-19500P.

Wafer fabrication processes listed below are to be performed at the following authorized locations:

- 1) Light Emitting Diode: Infratech Inc, 10440 Miller Road, Dallas, TX
- 2) Back Plating: Galco Electronics Inc, 12715 Eastgate Road, Mesquite, TX.
- 3) Phototransistor: Episil Technologies Inc, No3, Innovation Road I, Hsinchu Science Park, Hsinchu, Taiwan, R.O.C.

All assembly is to be performed at your Carrollton, TX facility. All qualification tests, conformance inspections, and screening must be performed at your facility or facilities that have DLA Land and Maritime -VQE Laboratory Suitability Status for each of the applicable test methods.

This certification will normally be valid for two years from the date of this letter and can only be terminated by written notification from this Center. For the duration of the certification, the manufacturer is subject to periodic reviews by the qualifying activity or its representatives. Certification will not normally be extended beyond the two-year period without a re-audit.

Note: The results of the DLA-VQE audits held on Dec 8-10, 2010 were found by examining a sampling of the manufacturer's normal manufacturing, and processing procedures. The acceptance of the corrective actions from the above referenced audit does not relieve the manufacturer of its contractual obligation to deliver product that complies with all specification requirements. Manufacturers are required to inform this office immediately after learning of a potential issuance of a GIDEP alert, problem advisory, or other notification on their QML product. If you have any questions, please contact Mr. DelloStritto at 614 692-0616 or email address carl.dello-stritto@dla.mil.

Sincerely,

JOSEPH GEMPERLINE
Chief
Sourcing and Qualifications Division



DEFENSE LOGISTICS AGENCY
 LAND AND MARITIME
 POST OFFICE BOX 3990
 COLUMBUS, OH 43218-3990

January 6, 2014

Mr. Sergio DeLaGarza
 Optek Technology Industries
 1645 Wallace Dr.
 Carrollton, TX 75006

Dear Mr. DeLaGarza:

Re: Notification of Qualification MIL-PRF-19500P, FSC 5961; VQ (VQE-14-027400)
 CAGE Code: 32694, Control Number: 041346


Qualification of your product is granted under the current issue of the specification as a result of successful qualification testing of device type JANTXV4N24A to Performance Specification MIL-PRF-19500P, Semiconductor Devices, FSC 5961, and performance specification /486 Rev H. Extension is also granted to other devices listed below as allowed by E 4.2.2 (Qualification by extension). Therefore, your products will be listed as shown below in Qualified Manufacturers List (QML) 19500. The effective date of this qualification is December 18, 2013. The starting lot date code is T1321.

Government Designation	ESD Class 6/	Manufacturer Designation	Test Report Reference	Prf Spec	Manufacturer Name & Address
** 4N22-4N24; A	1C	CDTF	19500-4037-14	/486	Same as above
** 4N47-4N49; A	1C			/548	Plant 2: Infratech Inc 10440 Miller Rd. Dallas, TX 75238 (LED) Plant 3: Episil Technologies Inc No 3 Innovation Rd. I Hsinchu Science Park, Hsinchu, Taiwan, R.O.C (Phototransistor)

6/ Testing is compliant to the latest revision of MIL-STD-750 Test Method 1020.3
 ** Includes JAN, JANTX & JANTXV quality levels only

This qualification approval is based upon test report number 19500-4037-14 for your die and package, your letter dated October 16, 2013, and your subsequent emails and data. This approval is subject to the conditions as stated in the SD-6 and DOD 4120.24M.

Because we are held responsible for the accuracy and currency of this Qualified Manufacturers List, please let us know if your company discontinues production of these products. Also, manufacturers are required to inform this office immediately after learning of a potential issuance of a GIDEP alert, problem advisory, or other problem notification on their QML product. If you have any questions, please contact Mr. DelloStritto 614-692-0616.

Sincerely,

 FOR
 JOSEPH GEMPERLINE
 Chief
 Sourcing and Qualifications Division