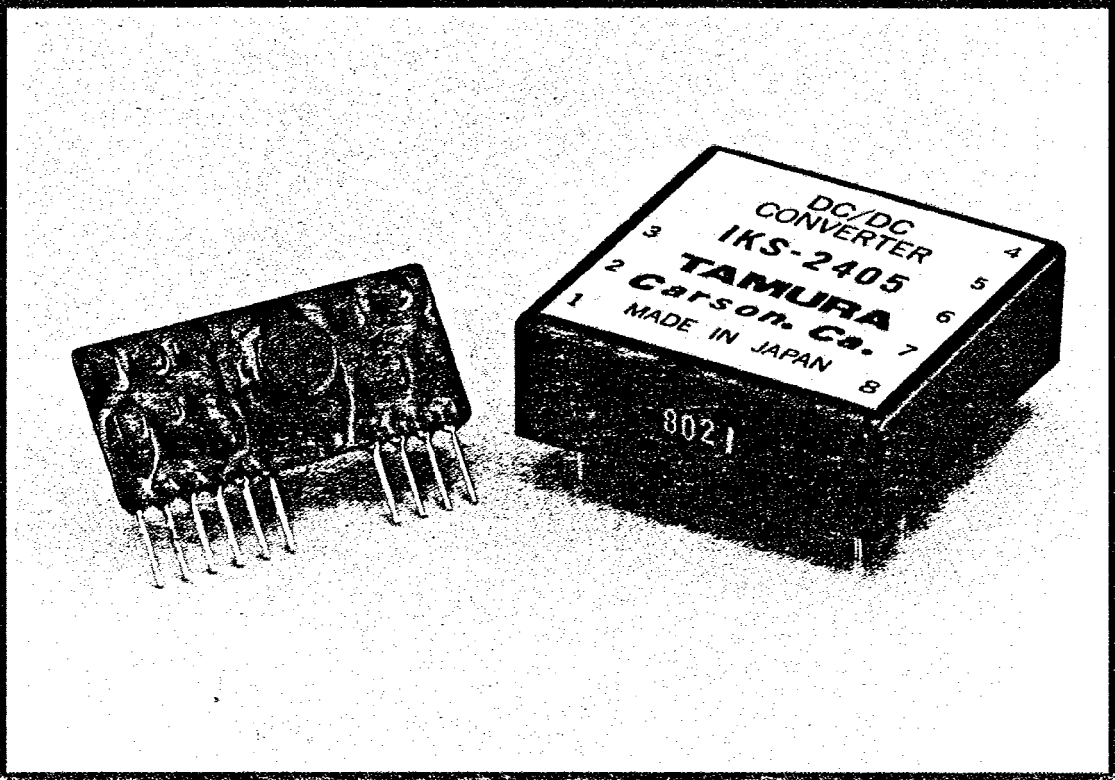
TAMURA

DELIVERS GREAT DC/DC ON–BOARD POWER CONVERSION



DC/DC CONVERTERS IN SIPs & DIPs

- Single and Dual Outputs
- 1 to 3.5VDC Battery Input
- 5, 12 & 24 VDC Inputs
- DC & 48VDC Input– Quad Outputs
- Voltage Decreasing
- Voltage Boosting
- Polarity Reversing
- 50 to 3,000mw Outputs
- Floating or Isolated Outputs
- 9V LAN Converters
- DC to Hi-VoltageAC Inverters
- Board Mountable SIP & DIP Pkgs
- High Density Hybrid Circuit (HIC) Design
- MIL-STD-202 Testing

Technical Bulletin No. 221

Polarity Reversing Non-Isolation Converters

MODEL NO.	Vin (VDC)	Vout (VDC)	Iout (ma)	C_1 (uF)	C_2 (uF)	$C_{3,4}$ (uF)	CKT
NAN-0505	5	−5	20.0	47	47	—	7
NAN-0512	5	−12	8.5	47	22	—	7
NCN-0505	5	−5	60.0	100	220	—	7
NCN-0512	5	−12	25.0	100	100	—	7

Voltage Boosting Non-Isolation Converters

MODEL NO.	Vin (VDC)	Vout (VDC)	Iout (ma)	C_1 (uF)	C_2 (uF)	$C_{3,4}$ (uF)	CKT
NAP-0512	5	12	8.4	47	22	—	7
NAP-0515	5	15	6.7	47	22	—	7
NAP-0524	5	24	4.2	47	10	—	7
NCP-0512	5	12	25.0	100	47	—	7
NCP-0515	5	15	20.0	100	47	—	7
NCP-0524	5	24	12.5	100	22	—	7
NDP-0512	5	12	42.0	220	100	—	7
NDP-0515	5	15	34.0	220	100	—	7
NDP-0524	5	24	21.0	220	47	—	7
NFP-0512	5	12	84.0	220	220	100	8
NFP-0515	5	15	67.0	220	220	47	8
NFP-0524	5	24	42.0	220	220	47	8

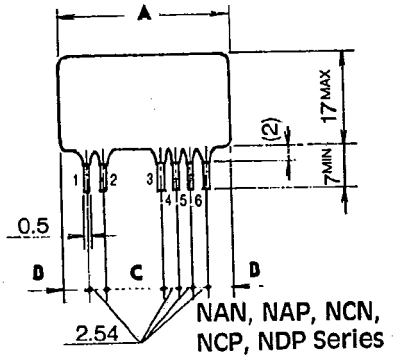
Economy Line Non-Isolation Converters

MODEL NO.	Vin (VDC)	Vout (VDC)	Iout (ma)	C_1 (uF)	C_2 (uF)	$C_{3,4}$ (uF)	CKT
RCN-0505	5	−5	60	100	220	—	10
RCN-0512	5	−12	25	100	100	—	10
RCN-1205	12	−5	60	47	220	—	10
RCN-1212	12	−12	25	47	100	—	10
RFP-2405	24	5	200	47	470	—	11
RHP-2405	24	5	400	100	1000	—	12

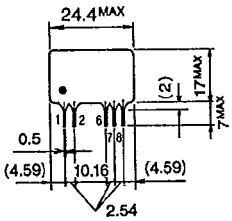
Battery Input Non-Isolation Converters

MODEL NO.	Vin (VDC)	Vout (VDC)	Iout (ma)	C_1 (uF)	C_2 (uF)	C_3 (uF)	CKT
BAN-0205	1 to 3.5	−5	10.00	47	47	—	13
BAN-0212	1 to 3.5	−12	4.17	47	22	—	13
BAN-0215	1 to 3.5	−15	3.33	47	22	—	13
BAP-0205	1 to 3.5	5	10.00	47	47	—	13
BAP-0212	1 to 3.5	12	4.17	47	22	—	13
BAP-0215	1 to 3.5	15	3.33	47	22	—	13

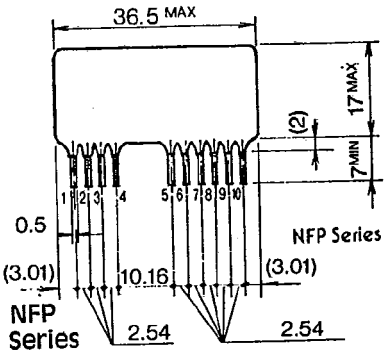
Pinout Dimensions: Non-Isolation Series



NAN, NAP, NCN, NCP, NDP Series

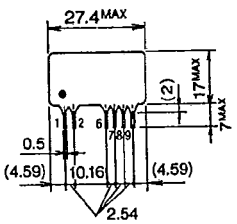


RCN Series

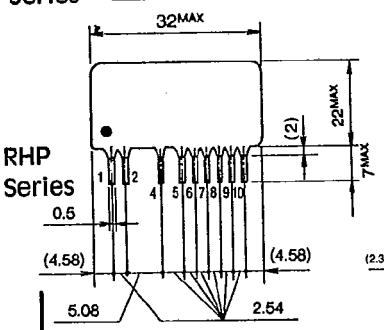


NFP Series

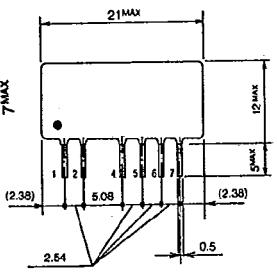
NFP Series



RFP Series



RHP Series



BAN and BAP Series

Non-Isolation Series Dimensions

SERIES	DIMENSIONS[1] A[2]	B	C	Wt[3]
NAN, NAP	20.5	2.63	5.08	2.3
NCN, NCP	24.4	4.58	5.08	2.8
NDP	29.5	4.59	10.16	3.3
NFP	— See Diagram —			4.4
RCN	— See Diagram —			2.5
RFP	— See Diagram —			3.0
RHP	— See Diagram —			4.8
BAN, BAP	— See Diagram —			1.8

NOTES: 1. Dimensions in mm
2. Maximum dimension
3. Weight in grams

0.3 Watt Isolation Converters

MODEL NO.	Vin (VDC)	Vout (VDC)	Iout (ma)	C_1 (uf)	C_2 (uf)	C_5 (uf)	CKT
ICS-0505	5	5	60	100	100	—	1
ICS-0512	5	12	25	100	47	—	1
ICD-0512	5	±12	12.5	100	22	22	2
ICS-1205	12	5	60	47	100	—	1
ICS-1212	12	12	25	47	47	—	1
ICD-1212	12	±12	12.5	47	22	22	2
ICS-2405	24	5	60	22	100	—	1
ICS-2412	24	12	25	22	47	—	1
ICD-2412	24	±12	12.5	22	22	22	2

0.5 Watt Isolation Converters

MODEL NO.	Vin (VDC)	Vout (VDC)	Iout (ma)	$C_{1,2}$ (uf)	C_3 (uf)	C_4 (uf)	CKT
IDS-0505	5	5	100	220	220	—	3
IDS-0512	5	12	42	220	100	—	3
IDD-0512	5	±12	21	220	47	47	4
IDS-1205	12	5	100	47	220	—	3
IDS-1212	12	12	42	47	100	—	3
IDD-1212	12	±12	21	47	47	47	4
IDS-2405	24	5	100	22	220	—	3
IDS-2412	24	12	42	22	100	—	3
IDD-2412	24	±12	21	22	47	47	4

1.0 Watt Isolation Converters

MODEL NO.	Vin (VDC)	Vout (VDC)	Iout (ma)	$C_{1,2}$ (uf)	$C_{3,4}$ (uf)	$C_{5,6}$ (uf)	CKT
IFS-0505	5	5	200	470	330	—	5
IFS-0512	5	12	84	470	100	—	5
IFD-0512	5	±12	42	470	47	47	6
IFS-0524	5	24	42	470	47	—	5
IFS-1205	12	5	200	100	330	—	5
IFS-1212	12	12	84	100	100	—	5
IFD-1212	12	±12	42	100	47	47	6
IFS-2405	24	5	200	47	330	—	5
IFS-2412	24	12	84	47	100	—	5
IFD-2412	24	±12	42	47	47	47	6

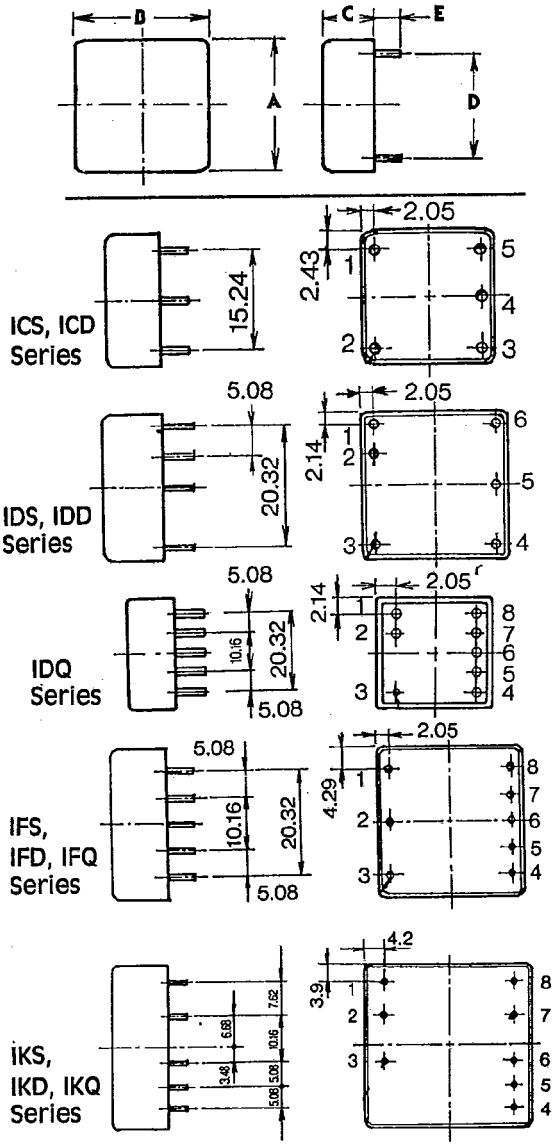
3.0 Watt Isolation Converters

MODEL NO.	Vin (VDC)	Vout (VDC)	Iout (ma)	$C_{1,2}$ (uf)	$C_{3,4}$ (uf)	$C_{5,6}$ (uf)	CKT
IKS-0505	5	5	600	2200	1000	—	5
IKD-0512	5	±12	125	2200	100	100	6
IKS-0524	5	24	125	2200	100	—	5
IKS-1205	12	5	600	470	1000	—	5
IKS-1212	12	12	250	470	330	—	5
IKD-1212	12	±12	125	470	100	100	6
IKS-2405	24	5	600	100	1000	—	5
IKS-2412	24	12	250	100	330	—	5
IKD-2412	24	±12	125	100	100	100	6

48V Telecom Multiple Output Converters

MODEL NO.	Vin (VDC)	Vout (VDC)	Iout (ma)	$C_{1,2}$ (uf)	$C_{3,4}$ (uf)	$C_{5,6}$ (uf)	CKT
IDQ-48A	48	±5 ±12	20.0 4.2	4.7	47	10	9
IFQ-48A	48	±5 ±12	33.0 7.1	10	100	22	9
IKQ-48A	48	±5 ±12	67.0 14.2	22	220	33	9

Pinout Dimensions - Isolation Series



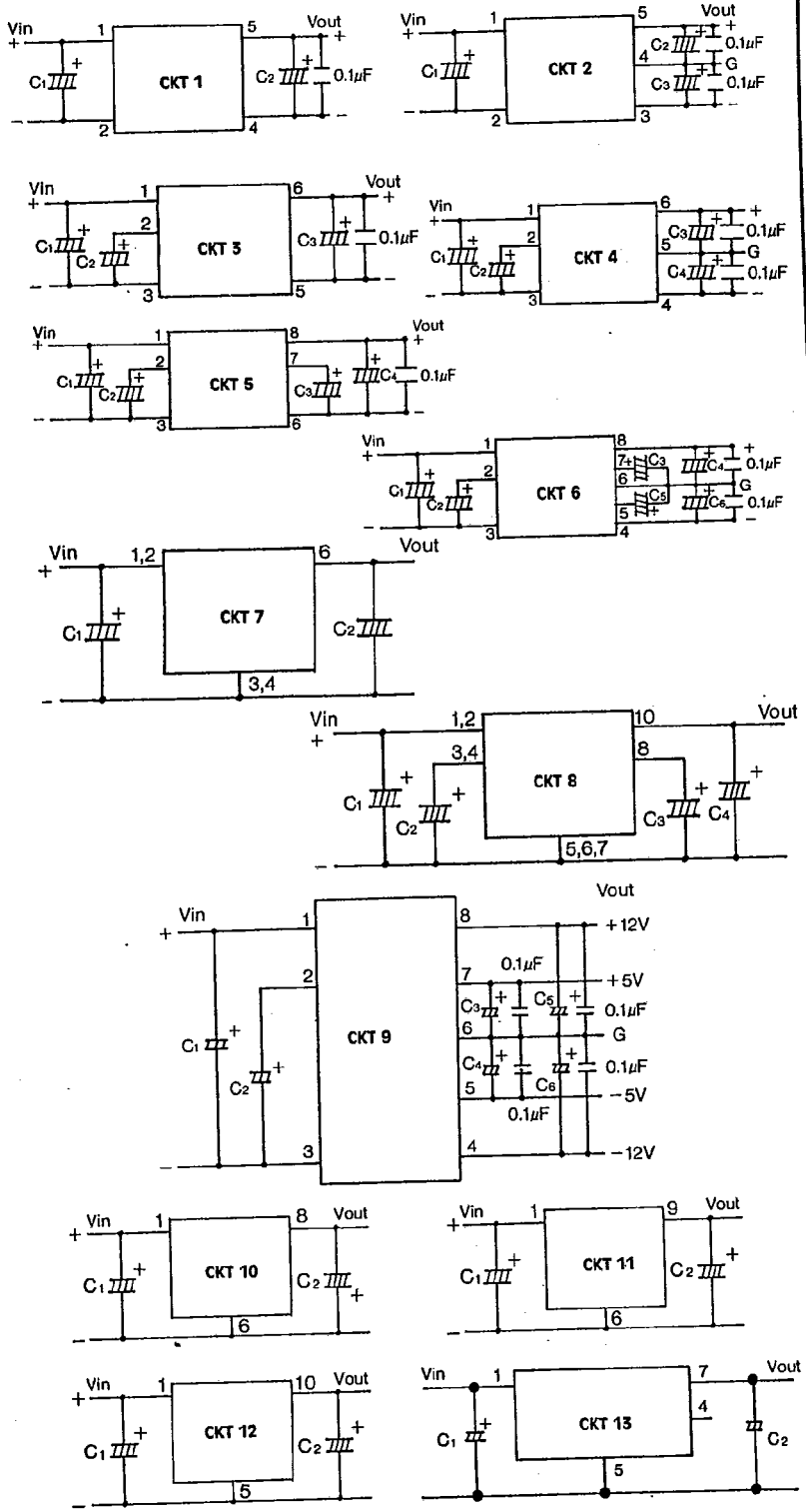
Isolation Series Dimensions

SERIES	DIMENSIONS[1] A[5]	B[5]	C[2]	D	E[4]	Wt[3]
ICS, ICD	20.1	20.1	8.5	16.0	4	6.3
IDS, IDD, IDQ	24.6	24.6	10.5	20.5	5	11.5
IFS, IFD, IFQ	26.9	28.9	10.5	22.8	5	14.7
IKS, IKD, IKQ	36.4	36.4	12.0	28.0	4	29.9

NOTES: 1. Dimensions in mm; pin dia. 0.75mm
2. Maximum dimension
3. Weight in grams
4. Minimum dimension
5. Tolerance ±0.3mm

Circuit Configurations

Suggested circuits for optimal performance.



General Specifications:

Input Voltage: 5VDC input models, ±10%; RFP and RHP models, ±30%. All others ±20% of nominal. 48VDC input range 42 to 60VDC. NOTE: Input voltage not to exceed 1.2 times nominal and do not reverse polarity.

Output Voltage: ±1% of nominal except IDQ, IFQ and IKQ, ±2%; RCN, RFP, RHP, BAN and BAP series, ±5%. Maximum no-load output voltage is 1.5 times nominal.

Output Current: See rating table. Load regulation is specified from 30% to 100% of output current rating.

Line Regulation: Isolation series: 0.5% of nominal; models -0505, 0.8%; Telcom series, 1%. Non-isolation series: 0.8% of nominal; models RCN, RFP and RHP, 1.2%; 5VDC BAN and BAP series, 2%; 12 / 15VDC BAN and BAP series 1%.

Load Regulation: Non-isolation series is 1.5%. Isolation series is 3% except 5VDC outputs, 6%, and Telcom series, 8%. Specified from 30% to 100% of output current rating.

Efficiency: Typically 60% to 72%.

Temperature Coefficient: 0.03% / °C max; RCN-0505, RCN-1205, RFP-2405 and RHP-2405, 0.05% / °C; RCN-0512, RCN-1212, BAN and BAP series, 0.1% / °C.

Overload Protection: Current limiting type circuitry on isolation series only. Short circuit current is 130% to 200% of rated output current. Non-isolation series will not withstand short circuit output.

Operating Frequency: 50kHz to 300kHz, full-load to no-load.

Ripple and Noise: 60mv typical, 100mv p-p max.

Operating Temperature: Full rated output from −10°C to +70°C without derating.

Storage Temperature: −30°C to +85°C.

Humidity: 95% RH.

Weight: See table.

Case Material: SIP series: UL94V-0 epoxy. DIP series: UL94V-0 epoxy potting and case material for 0.3 to 1.0 watt models; 0.3mm aluminum case for 3.0 watt series.

Insulation Resistance: 50 Megohm at 500VDC min.

Dielectric Voltage: Isolation series only, 500VDC, primary to secondary for one minute.

Solderability: 230°C ±5°C; dipping time 5 sec ±0.5 sec. MIL-STD-202, method 208C.

Soldering Heat Resistance: 260°C ±5°C; dipping time 10 sec ±1 sec. MIL-STD-202, method 210A.

Temperature Cycling: 5 cycles; −30°C to +85°C at 30 min. each. MIL-STD-202, method 102A.

Vibration: Smallest of longest distance: 1.52mm or 15G, 10-2,000 Hz. MIL-STD-202, method 204C.

Shock: 50G half-wave sine wave. MIL-STD-202, method 213B.

Humidity Resistance: 40°C, 95% R.H; 1344 hours. MIL-STD-202, method 103B.

High Temperature Life: 500 hours at +70°C, fixed rated FL current. MIL-STD-202, method 108A.

Terminal Strength: Tensil 2.2kg, bending 90° 3 times. MIL-STD-202, method 211A.

NOTE: Specifications and prices subject to change without notice.

Tamura's DC / DC converters provide board level DC power conversion eliminating costly regulator circuitry and additional off-board power supplies, and avoids time consuming safety agency certification.

Non-Isolation SIP Series
28 single output SIP models complement your main power supply by providing voltage reversing, voltage boosting, voltage decreasing and direct battery input.

Isolation DIP Series
40 DIP models offer single and dual outputs from 300 to 3000mw with built-in noise filter inductors and overcurrent protection. For telcom requirements, Tamura offers 48VDC quad output devices.

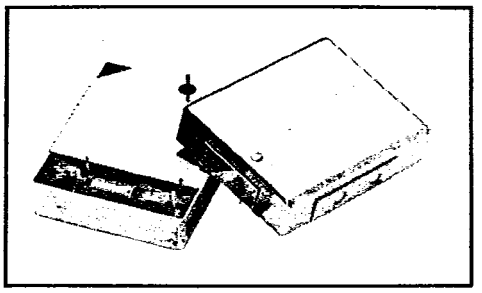
Proprietary HIC Design
Tamura's DC / DC converter line utilizes proprietary SMD high density hybrid circuit (HIC) design and unique transformer technology resulting in efficiency ratings to 70% and optimum reliability.

Pricing Information

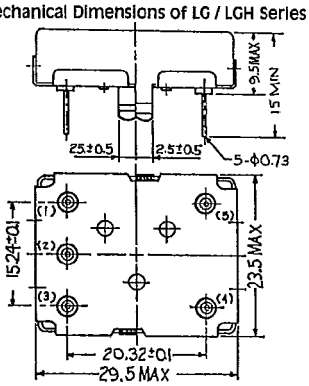
Part No. Prefix	Qty 10	Qty 100
NAN	$10.80	$9.00
NCN	11.50	9.60
NAP	10.80	9.00
NCP	11.50	9.60
NDP	12.30	10.30
NFP	13.80	11.50
RCN	7.40	6.20
RFP	7.60	6.30
RHP	8.40	7.00
BAN	10.00	8.30
BAP	10.00	8.30
ICS	14.80	12.30
ICD	15.90	13.30
IDS	17.40	14.50
IDD	18.10	15.10
IFS	21.50	17.90
IFD	22.20	18.50
IKS	30.90	25.70
IKD	31.70	26.40
IDQ	19.10	15.90
IFQ	23.90	19.90
IKQ	25.70	21.40
ISS	Contact Factory	
LG	36.50	30.50
LGH	36.50	30.50
SAT	9.80	8.20
CX	21.70	18.10

LAN DC / DC Converter

Partial Specifications



Mechanical Dimensions of LG / LGH Series



MODEL NO.	INPUT VOLTAGE (VDC)	OUTPUT VOLTAGE (VDC)	OUTPUT CURRENT (ma)	DIELECTRIC VOLTAGE (VDC)
ISS-0509	+4.5 to +5.5	−9	80 to 160	500
ISS-1209	+9.5 to +16.0	−9	80 to 160	2000
LG-0509	+4.5 to +5.5	−9	80 to 160	500
LGH-0509	+4.5 to +5.5	−9	80 to 160	2000
LG-1209	+9.5 to +16.0	−9	80 to 160	500
LGH-1209	+9.5 to +16.0	−9	80 to 160	2000

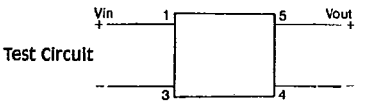
Load Regulation:
±4% at rated input and 25°C.

Line Regulation:
±2.5% max. at 110ma load.

Shielded Case:
Nickel plated copper case with UL94V-0 epoxy potting.

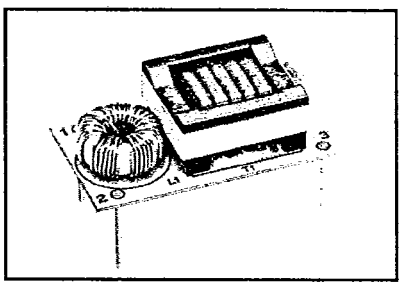
Temperature Coefficient:
±.03% / °C

Ripple:
150mv p-p at rated input and 160ma load.



DC to High Voltage AC Inverters

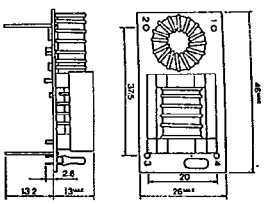
CX-100 Series Inverter

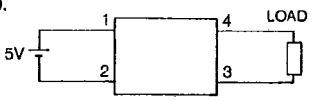


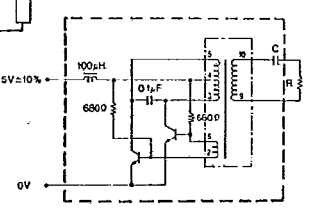
Features:
- ☐ Low Cost
- ☐ Small Size
- ☐ −20°C to +60°C Operating Temperature
- ☐ −30°C to +85°C Storage Temperature
- ☐ 5.00VDC ±10% Input Voltage

Tamura's CX-100 series inverter is ideally suited for computer display back light applications where small size and low cost are desired. These features are achieved through the use of a flat transformer and automated assembly processing.

The inverter may be specified as a complete unit (CX series) or the transformer may be specified independently (SAT series).







Inverter and Transformer Specifications[1]

Inverter Model Number	XFMR Model Number	Open Output Voltage	Rated Output Current	Rated Load (R)	Working Frequency	Sec. Cap. (C)	Typ. Eff. (%)
CX-101	SAT-340	390Vrms	6mArms	33kΩ	36kHz±20%	68pf	75
CX-102	SAT-341	470Vrms	6mArms	39kΩ	40kHz±20%	47pf	78
CX-103	SAT-342	560Vrms	6mArms	47kΩ	36kHz±20%	47pf	81
CX-104	SAT-343	680Vrms	6mArms	56kΩ	40kHz±20%	33pf	77

NOTE: 1. Custom inverters available. Contact factory.