

NACGL.XXT-P6/VN 系列电流传感器 Current Transducer

$I_{PN} = 6, 15, 25, 50A$

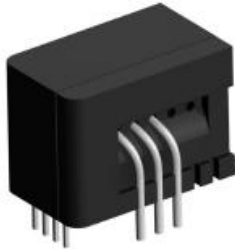
The NACGL.XXT-P6/VN series Current Transducer is for the electronic measurement of DC, AC or pulsed currents, with galvanic separation between the primary circuit and the secondary circuit.

Features

- Closed loop multi-range current transducer
- Voltage output
- Unipolar supply voltage.

Standards

- EN50178:2017
- IEC61010-1:2010
- IEC62109-1:2010



Typical application

- Solar inverter
- Uninterruptible Power Supplies (UPS)
- Switched model power supplies (SMPS)
- Frequency converter
- Battery supplied application
- Static converter for DC motor drives

Absolute rating

Parameter	Symbol	Unit	Specification			Conditions
			Min	Typical	Max	
Maximum supply voltage	$U_{C\ max}$	V			7	
Maximum primary current	$I_{P\ max}$	A			$10 \times I_{PN}$	
Ambient storage temperature	T_S	°C	-40		105	
Ambient operating temperature	T_A	°C	-40		105	
Electrostatic discharge voltage	V_{ESD}	kV			4	HBM
Primary busbar temperature	$T_{B\ max}$	°C			110	

Insulation coordination

Parameter	Symbol	Unit	Specification			Conditions
			Min	Typical	Max	
Dielectric withstand voltage	V_D	kV			4.1	RMS voltage for AC test 50Hz, 1min
Impulse withstand voltage	V_{Ni}	kV			7.5	1.2/50us
Insulation resistance	R_{INS}	MΩ	500			500V
Clearance distance	d_{CI}	mm	7.5			Shortest distance through air
Creepage distance	d_{CP}	mm	7.5			Shortest path along device body
Comparative tracking index	CTI	V		600		
Case material	-	-		V0		According to UL 94

Electrical parameters_NACGL.6-P6/VN

At $T_A = 25^{\circ}C$, $U_C = +5\ V$, $N_P = 1\ turn$, $R_L = 10\ k\Omega$, internal refernece unless otherwise noted.

Parameter	Symbol	Unit	Specification			Conditions
			Min	Typical	Max	
Primary current, nominal range	I_{PN}	A		6		RMS current
Primary current, measuring range	I_{PM}	A	-20		20	
Number of primary turns	N_P			1,2,3		
Supply voltage	U_C	V	4.75	5	5.25	
Current consumption	I_C	mA		$15 + (I_P/N_S)$	$20 + (I_P/N_S)$	$N_S = 1731\ turns$
Reference voltage @ $I_P = 0A$	V_{ref}	V	2.495	2.5	2.505	Internal reference
External reference voltage	V_{ref}	V	0		4	
Output voltage range	V_{out}	V	0.375		4.625	
Output voltage @ $I_P = 0A$	V_{out}	V		V_{ref}		
Electrical offset voltage @ $I_P = 0A$	V_{OE}	mV	-5.3		5.3	$V_{out} - V_{ref}$
Electrical offset current referred to primary @ $I_P = 0A$	I_{OE}	mA	-51		51	
Temperature coefficient of V_{ref}	TCV_{ref}	ppm/K		± 5	± 50	Internal reference, ppm/k of 2.5V,-40~105°C
Temperature coefficient of V_{out} @ $I_P = 0A$	TCV_{OUT}	ppm/K		± 6	± 14	ppm/k of 2.5V,-40~105°C
Theoretical sensitivity	G_{th}	mV/A		104.2		$625mV @ I_{PN}$

Parameter	Symbol	Unit	Specification			Conditions
			Min	Typical	Max	
Sensitivity error	ε_S	% of I_{PN}	-0.7		0.7	
Temperature coefficient of G	TCG	ppm/k			± 40	-40~105℃
Linearity error	ε_L	% of I_{PN}	-0.1		0.1	
Magnetic offset current (10× I_{PN}) referred to primary	I_{OM}	A	-0.1		0.1	
Step response time to 90 % of I_{PN}	t_r	μs			1	$R_L=1k\ \Omega$, $di/dt=18\ A/\mu s$
Frequency bandwidth ($\pm 1dB$) ¹⁾	BW	kHz		± 200		$R_L=1k\ \Omega$
Accuracy @25℃	X	% of I_{PN}	-0.8		0.8	
Accuracy @105℃	X	% of I_{PN}	-1.6		1.6	
Overall accuracy @25℃	X	% of I_{PN}	-1.7		1.7	
Overall accuracy @105℃	X	% of I_{PN}	-2.4		2.4	
Load resistance	R_L	kΩ	1	10		

Electrical parameters_NACGL.15-P6/VN

At $T_A=25^{\circ}C$, $U_C=+5\ V$, $N_P=1\ turn$, $R_L=10\ k\Omega$, internal refernece unless otherwise noted.

Parameter	Symbol	Unit	Specification			Conditions
			Min	Typical	Max	
Primary current, nominal range	I_{PN}	A		15		RMS current
Primary current, measuring range	I_{PM}	A	-51		51	
Number of primary turns	N_P			1,2,3		
Supply voltage	U_C	V	4.75	5	5.25	
Current consumption	I_C	mA		$15+(I_P/N_S)$	$20+(I_P/N_S)$	$N_S=1731\ turns$
Reference voltage @ $I_P=0A$	V_{ref}	V	2.495	2.5	2.505	Internal reference
External reference voltage	V_{ref}	V	0		4	
Output voltage range	V_{out}	V	0.375		4.625	
Output voltage @ $I_P=0A$	V_{out}	V		V_{ref}		
Electrical offset voltage @ $I_P=0A$	V_{OE}	mV	-2.21		2.21	$V_{out}-V_{ref}$
Electrical offset current referred to primary @ $I_P=0A$	I_{OE}	mA	-53		53	
Temperature coefficient of V_{ref}	TCV_{ref}	ppm/K		± 5	± 50	Internal reference, ppm/k of 2.5V,-40~105℃
Temperature coefficient of V_{out} @ $I_P=0A$	TCV_{OUT}	ppm/K		± 2.3	± 6	ppm/k of 2.5V,-40~105℃
Theoretical sensitivity	G_{th}	mV/A		41.67		625mV@ I_{PN}
Sensitivity error	ε_S	% of I_{PN}	-0.7		0.7	
Temperature coefficient of G	TCG	ppm/k			± 40	-40~105℃
Linearity error	ε_L	% of I_{PN}	-0.1		0.1	
Magnetic offset current (10× I_{PN}) referred to primary	I_{OM}	A	-0.1		0.1	
Step response time to 90 % of I_{PN}	t_r	μs			1	$R_L=1k\Omega$, $di/dt=44\ A/\mu s$
Frequency bandwidth ($\pm 1dB$) ¹⁾	BW	kHz		± 200		$R_L=1k\ \Omega$
Accuracy @25℃	X	% of I_{PN}	-0.8		0.8	
Accuracy @105℃	X	% of I_{PN}	-1.3		1.3	
Overall accuracy @25℃	X	% of I_{PN}	-1.2		1.2	
Overall accuracy @105℃	X	% of I_{PN}	-1.7		1.7	
Load resistance	R_L	KΩ	1	10		

Electrical parameters_NACGL.25-P6/VN

At $T_A=25^{\circ}C$, $U_C=+5\ V$, $N_P=1\ turn$, $R_L=10\ k\Omega$, internal refernece unless otherwise noted.

Parameter	Symbol	Unit	Specification			Conditions
			Min	Typical	Max	
Primary current, nominal range	I_{PN}	A		25		RMS current
Primary current, measuring range	I_{PM}	A	-85		85	
Number of primary turns	N_P			1,2,3		
Supply voltage	U_C	V	4.75	5	5.25	

Parameter	Symbol	Unit	Specification			Conditions
			Min	Typical	Max	
Current consumption	I _C	mA		15+(I _P /N _S)	20+(I _P /N _S)	N _S = 1731 turns
Reference voltage @I _P = 0A	V _{ref}	V	2.495	2.5	2.505	Internal reference
External reference voltage	V _{ref}	V	0		4	
Output voltage range	V _{out}	V	0.375		4.625	
Output voltage @I _P = 0A	V _{out}	V		V _{ref}		
Electrical offset voltage @I _P = 0A	V _{OE}	mV	-1.35		1.35	V _{out} - V _{ref}
Electrical offset current referred to primary @I _P = 0A	I _{OE}	mA	-54		54	
Temperature coefficient of V _{ref}	TCV _{ref}	ppm/K		± 5	± 50	Internal reference, ppm/k of 2.5V,-40~105℃
Temperature coefficient of V _{out} @I _P = 0A	TCV _{OUT}	ppm/K		± 1.4	± 4	ppm/k of 2.5V,-40~105℃
Theoretical sensitivity	G _{th}	mV/A		25		625mV@I _{PN}
Sensitivity error	ε _S	% of I _{PN}	-0.7		0.7	
Temperature coefficient of G	TCG	ppm/k			± 40	-40~105℃
Linearity error	ε _L	% of I _{PN}	-0.1		0.1	
Magnetic offset current (10×I _{PN}) referred to primary	I _{OM}	A	-0.1		0.1	
Step response time to 90 % of I _{PN}	t _r	μs			1	R _L =1kΩ, di/dt =50 A/μs
Frequency bandwidth (± 1dB) ¹⁾	BW	kHz		± 200		R _L =1k Ω
Accuracy @25℃	X	% of I _{PN}	-0.8		0.8	
Accuracy @105℃	X	% of I _{PN}	-1.25		1.25	
Overall accuracy @25℃	X	% of I _{PN}	-1.0		1.0	
Overall accuracy @105℃	X	% of I _{PN}	-1.45		1.45	
Load resistance	R _L	KΩ	1	10		

Electrical parameters NACGL.50-P6/VN

At T_A = 25℃, U_C = +5 V, N_P = 1 turn, R_L = 10 kΩ, internal refernece unless otherwise noted.

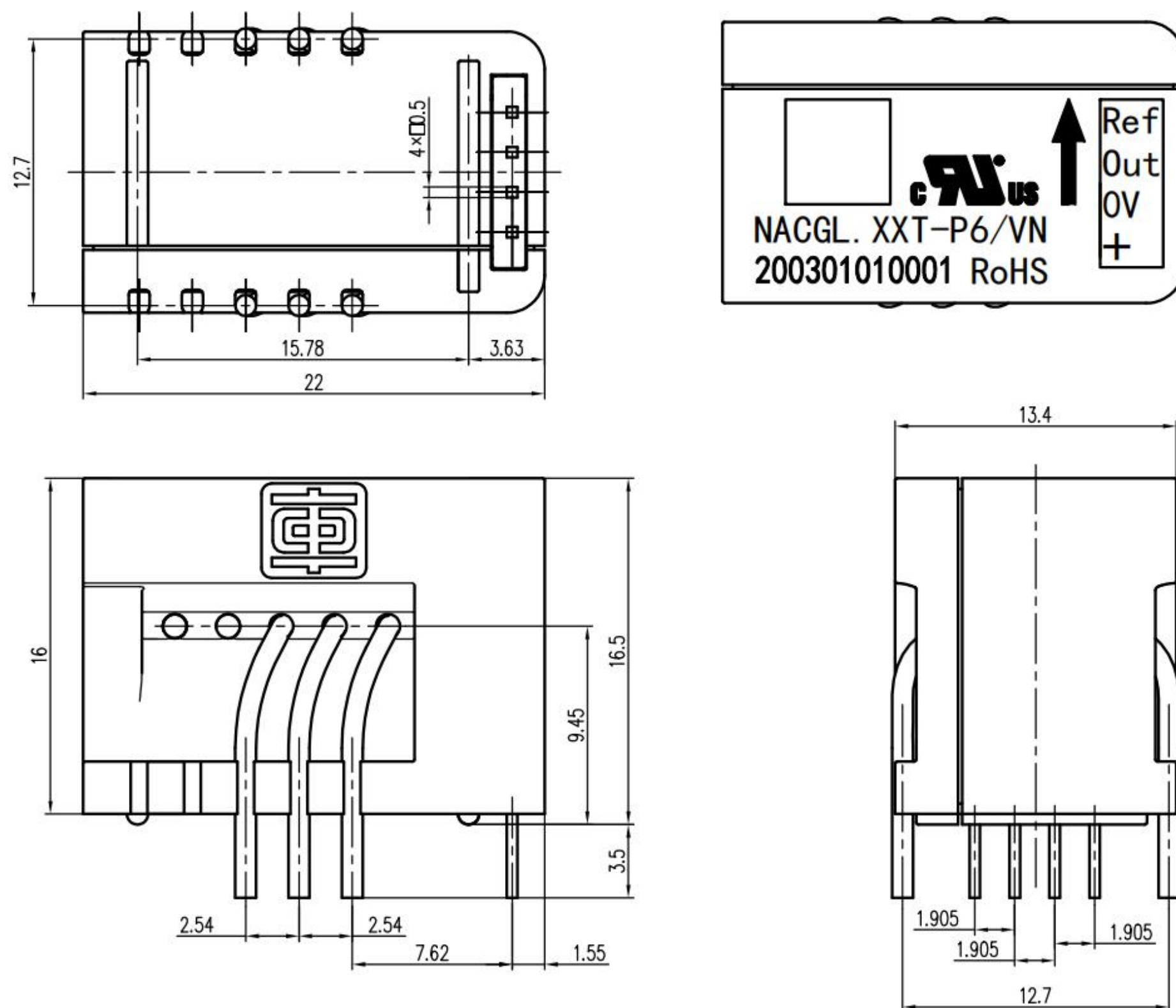
Parameter	Symbol	Unit	Specification			Conditions
			Min	Typical	Max	
Primary current, nominal range	I _{PN}	A		50		RMS current
Primary current, measuring range	I _{PM}	A	-150		150	
Number of primary turns	N _P			1,2,3		
Supply voltage	U _C	V	4.75	5	5.25	
Current consumption	I _C	mA		15+(I _P /N _S)	20+(I _P /N _S)	N _S = 966 turns
Reference voltage @I _P = 0A	V _{ref}	V	2.495	2.5	2.505	Internal reference
External reference voltage	V _{ref}	V	0		4	
Output voltage range	V _{out}	V	0.375		4.625	
Output voltage @I _P = 0A	V _{out}	V		V _{ref}		
Electrical offset voltage @I _P = 0A	V _{OE}	mV	-0.725		0.725	V _{out} - V _{ref}
Electrical offset current referred to primary @I _P = 0A	I _{OE}	mA	-58		58	
Temperature coefficient of V _{ref}	TCV _{ref}	ppm/K		± 5	± 50	Internal reference, ppm/k of 2.5V,-40~105℃
Temperature coefficient of V _{out} @I _P = 0A	TCV _{OUT}	ppm/K		± 0.7	± 3	ppm/k of 2.5V,-40~105℃
Theoretical sensitivity	G _{th}	mV/A		12.5		625mV@I _{PN}
Sensitivity error	ε _S	% of I _{PN}	-0.7		0.7	
Temperature coefficient of G	TCG	ppm/k			± 40	-40~105℃
Linearity error	ε _L	% of I _{PN}	-0.1		0.1	
Magnetic offset current (10×I _{PN}) referred to primary	I _{OM}	A	-0.1		0.1	
Step response time to 90 % of I _{PN}	t _r	μs			1	R _L =1kΩ, di/dt =50 A/μs
Frequency bandwidth (± 1dB) ¹⁾	BW	kHz		± 200		R _L =1kΩ
Accuracy @25℃	X	% of I _{PN}	-0.8		0.8	
Accuracy @105℃	X	% of I _{PN}	-1.3		1.3	
Overall accuracy @25℃	X	% of I _{PN}	-0.9		0.9	

Parameter	Symbol	Unit	Specification			Conditions
			Min	Typical	Max	
Overall accuracy @105°C	X	% of I_{PN}	-1.3		1.3	
Load resistance	R_L	K Ω	1	10		

Notes:

- 1) The frequency bandwidth test is for small signal.
- 2) Please contact CRRC if current transducer is applied in some extreme cases, for example: high frequency ripple, high temperature, larger operating frequency.....

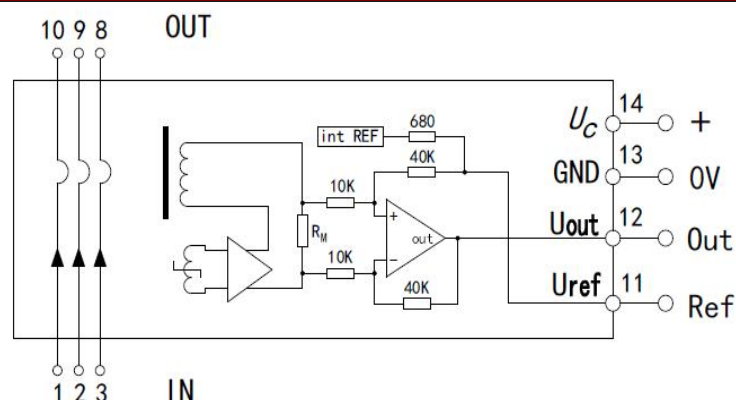
Dimensions(in mm)



Mechanical characteristics

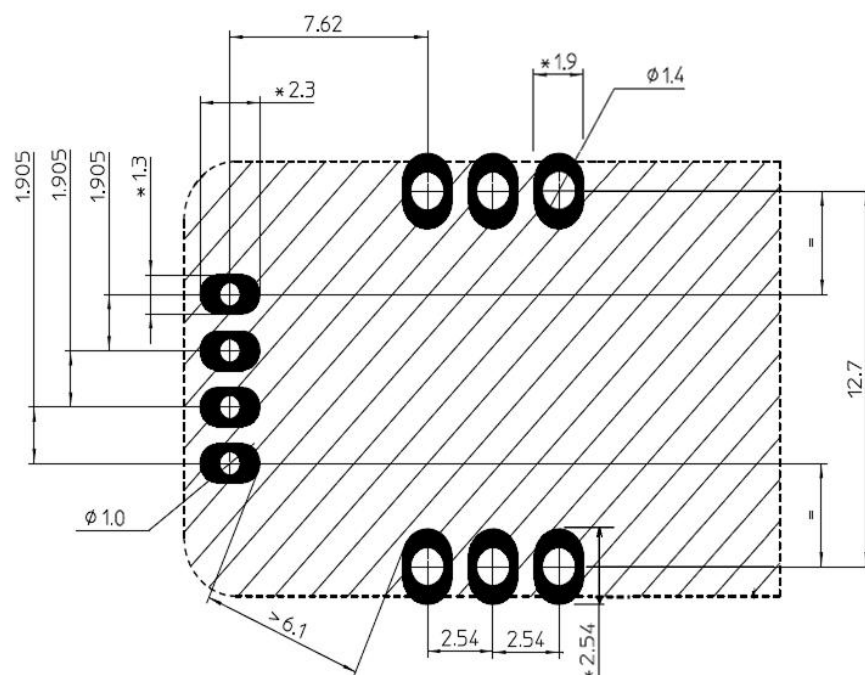
- Mass: 9g±3g
- General tolerance: ±0.5mm

Connection



PIN NO.	PIN NAME	Function
1	+U _C	Positive supply voltage
2	GND	Ground connection
3	V _{OUT}	Vout output voltage
4	V _{ref}	Internal reference output voltage.

PCB footprint according to the product (in mm)

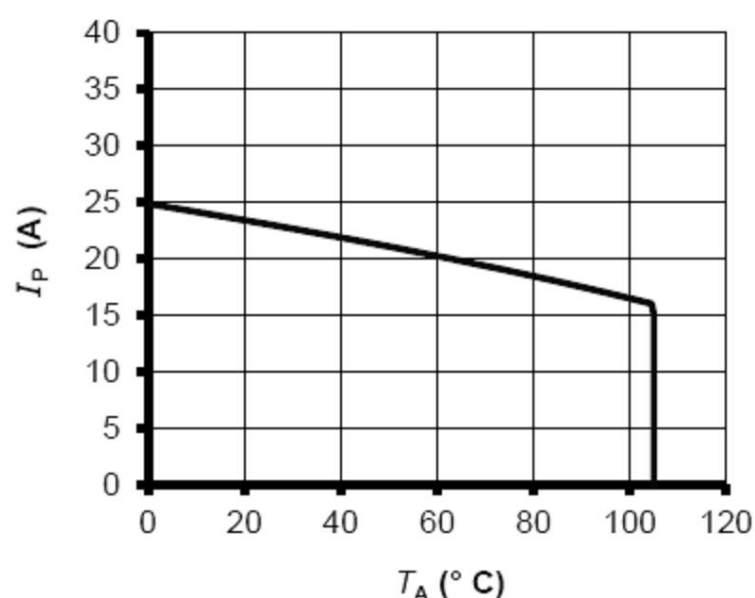


Note:

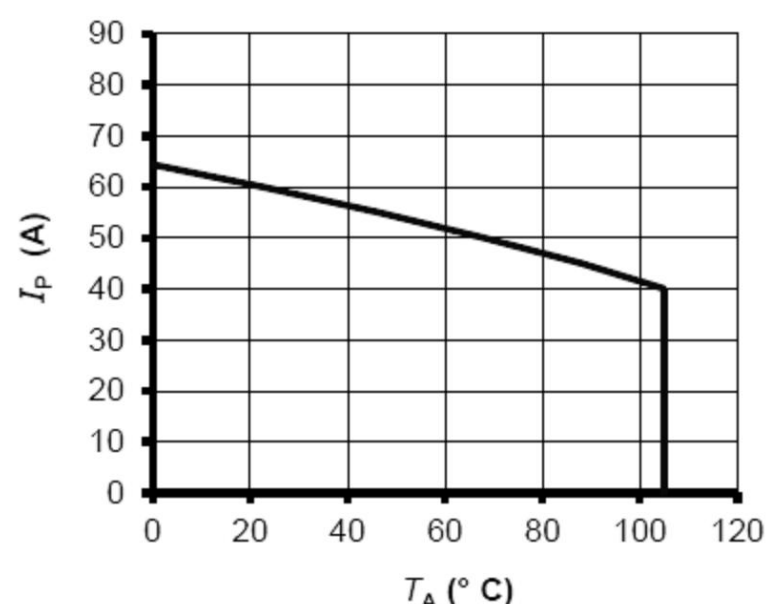
- Wave soldering profile: maximum 260°C for 10 seconds.
- Maximum PCB thickness: 2.5mm.
- Avoid primary tracks near the secondary area as it will reduce DCp/DCI.

Maximum continuous DC primary current

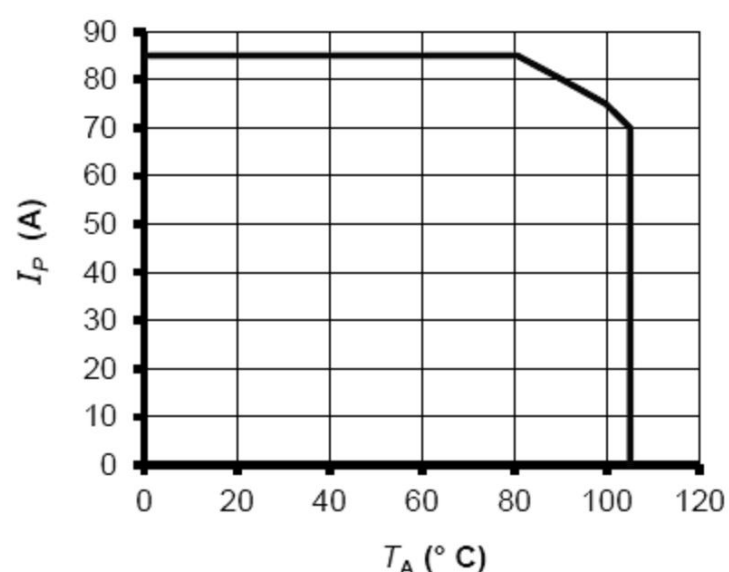
Maximum continuous DC primary current(@Uc=5V)



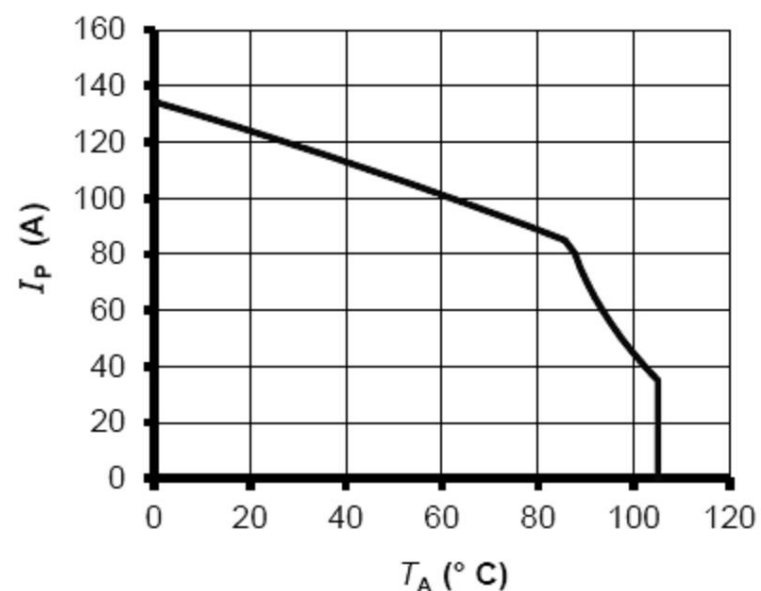
I_P VS T_A for NACGL.6T-P6/VN



I_P VS T_A for NACGL.15T-P6/VN



I_P VS T_A for NACGL.25T-P6/VN



I_P VS T_A for NACGL.50T-P6/VN

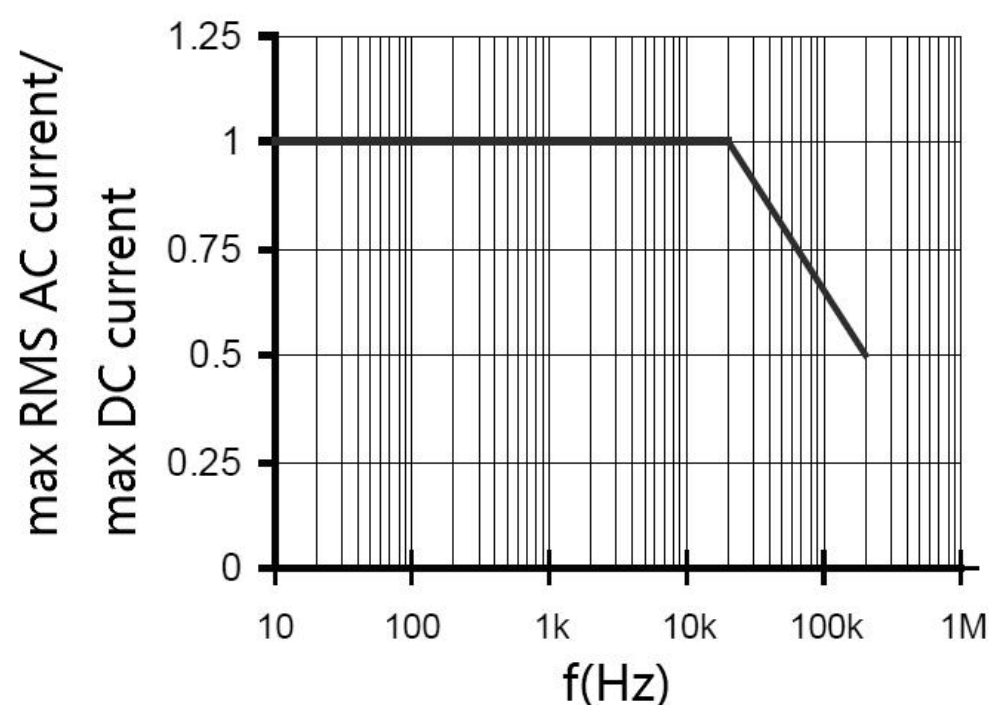
Note: the maximum continuous DC primary current plot shows the boundary of the area for which all the following conditions are true:

- $I_P < I_{PM}$
- Junction temperature $T_j < 125^\circ\text{C}$
- Primary conductor temperature $< 110^\circ\text{C}$

Frequency derating

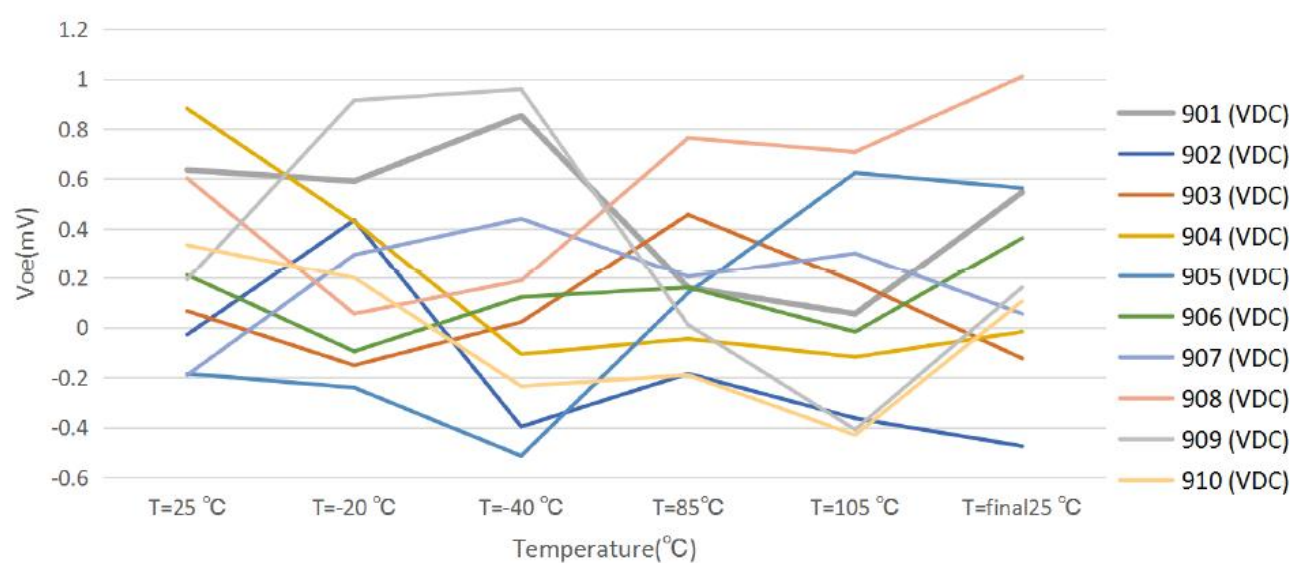
Maximum RMS AC primary current / maximum DC primary current VS frequency

AC Derating

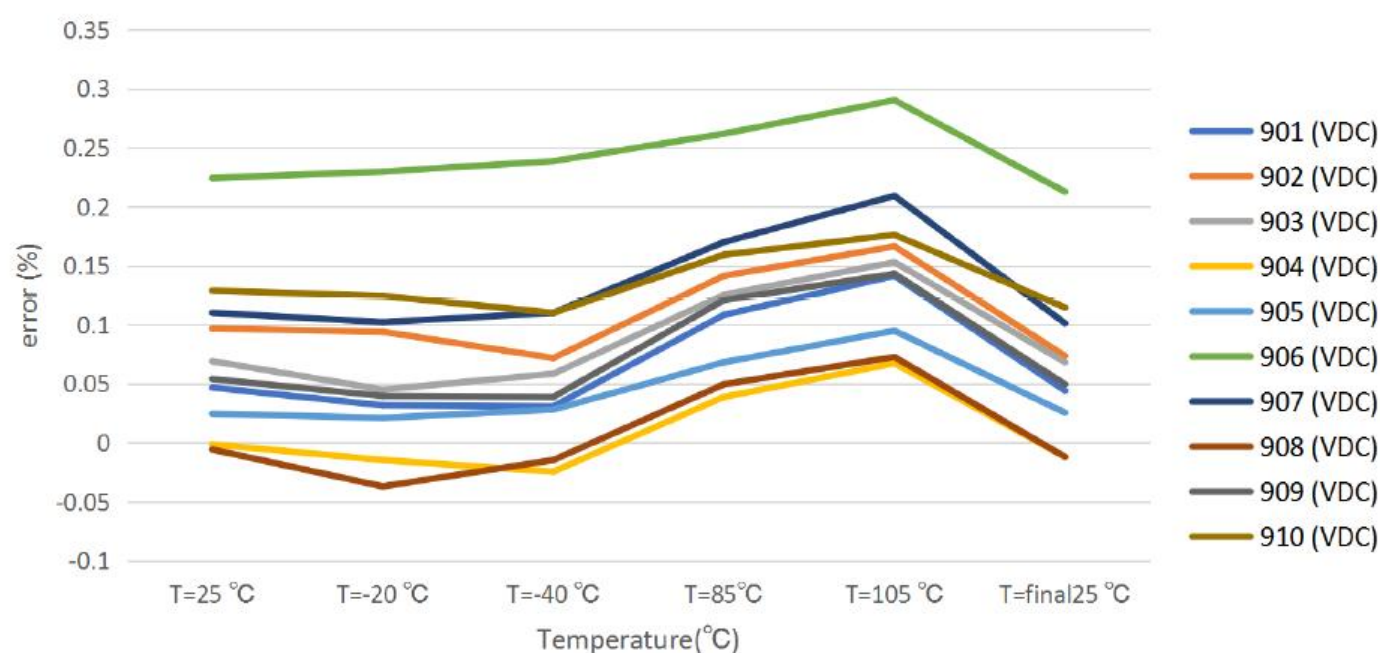


Typical performance characteristics

Electrical offset voltage with $U_c=5V$



Gain error with $U_c=5V$, $I_p=25A$



Remarks

- It is advised to use a primary conductor (busbar) that fills transducer through-hole.
- Be aware of the influence of the external field if nearby transducers are too close (relay, capacitor, choke...).

Comments:

- Items with “*” in this datasheet are recommended value for reference only. The final value must be determined by customer.
- CRRC reserves the right to carry out modifications on its transducers, in order to improve them.