

#Netrol-NACGL.XXT-P6/VN Current Transducer

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

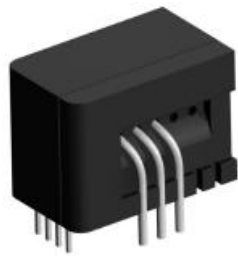
The #Netrol-NACGL.XXT-P6/VN series Current Transducer is for the electronic measurement of DC, AC or pulsed currents, with galvanic separation between the primary circuit and the secondary circuit.

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.6T-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

Parameter	Symbol	Unit	Specification			Conditions
			Min	Typical	Max	
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}
Sensitivity error	ϵ_S	% of I_{PN}	-0.7		0.7	
Temperature coefficient of G	TCG	ppm/k			± 40	-40~105°C
Linearity error	ϵ_L	% of I_{PN}	-0.1		0.1	
Magnetic offset current ($10 \times I_{PN}$) 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°C	X	% of I_{PN}	-0.8		0.8	
Accuracy @105°C	X	% of I_{PN}	-1.6		1.6	
Overall accuracy @25°C	X	% of I_{PN}	-1.7		1.7	
Overall accuracy @105°C	X	% of I_{PN}	-2.4		2.4	
Load resistance	R_L	k Ω	1	10		

Electrical parameters_NACGL15T-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°C
Temperature coefficient of V_{out} @ $I_p = 0A$	TCV_{OUT}	ppm/K		± 2.3	± 6	ppm/k of 2.5V, -40~105°C
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°C
Linearity error	ϵ_L	% of I_{PN}	-0.1		0.1	

Parameter	Symbol	Unit	Specification			Conditions
			Min	Typical	Max	
Magnetic offset current ($10\times I_{PN}$) 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°C	X	% of I_{PN}	-0.8		0.8	
Accuracy @105°C	X	% of I_{PN}	-1.3		1.3	
Overall accuracy @25°C	X	% of I_{PN}	-1.2		1.2	
Overall accuracy @105°C	X	% of I_{PN}	-1.7		1.7	
Load resistance	R_L	K Ω	1	10		

Electrical parameters_NACGL.25T-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	
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°C
Temperature coefficient of V_{out} @ $I_P=0A$	TCV_{OUT}	ppm/K		± 1.4	± 4	ppm/k of 2.5V,-40~105°C
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°C
Linearity error	ϵ_L	% of I_{PN}	-0.1		0.1	
Magnetic offset current ($10\times I_{PN}$) referred to primary	I_{OM}	A	-0.1		0.1	
Step response time to 90 % of I_{PN}	t_r	μs			1	$R_L=1k\Omega$, $di/dt=50 A/\mu s$
Frequency bandwidth ($\pm 1dB$) ¹⁾	BW	kHz		± 200		$R_L=1k\Omega$
Accuracy @25°C	X	% of I_{PN}	-0.8		0.8	
Accuracy @105°C	X	% of I_{PN}	-1.25		1.25	
Overall accuracy @25°C	X	% of I_{PN}	-1.0		1.0	
Overall accuracy @105°C	X	% of I_{PN}	-1.45		1.45	
Load resistance	R_L	K Ω	1	10		

Electrical parameters NACGL.50T-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.

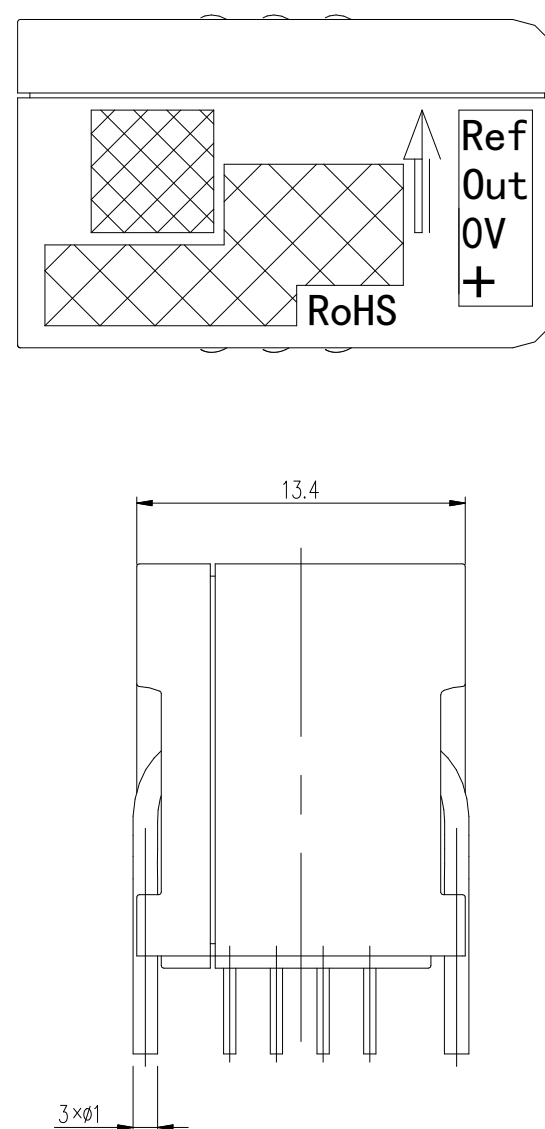
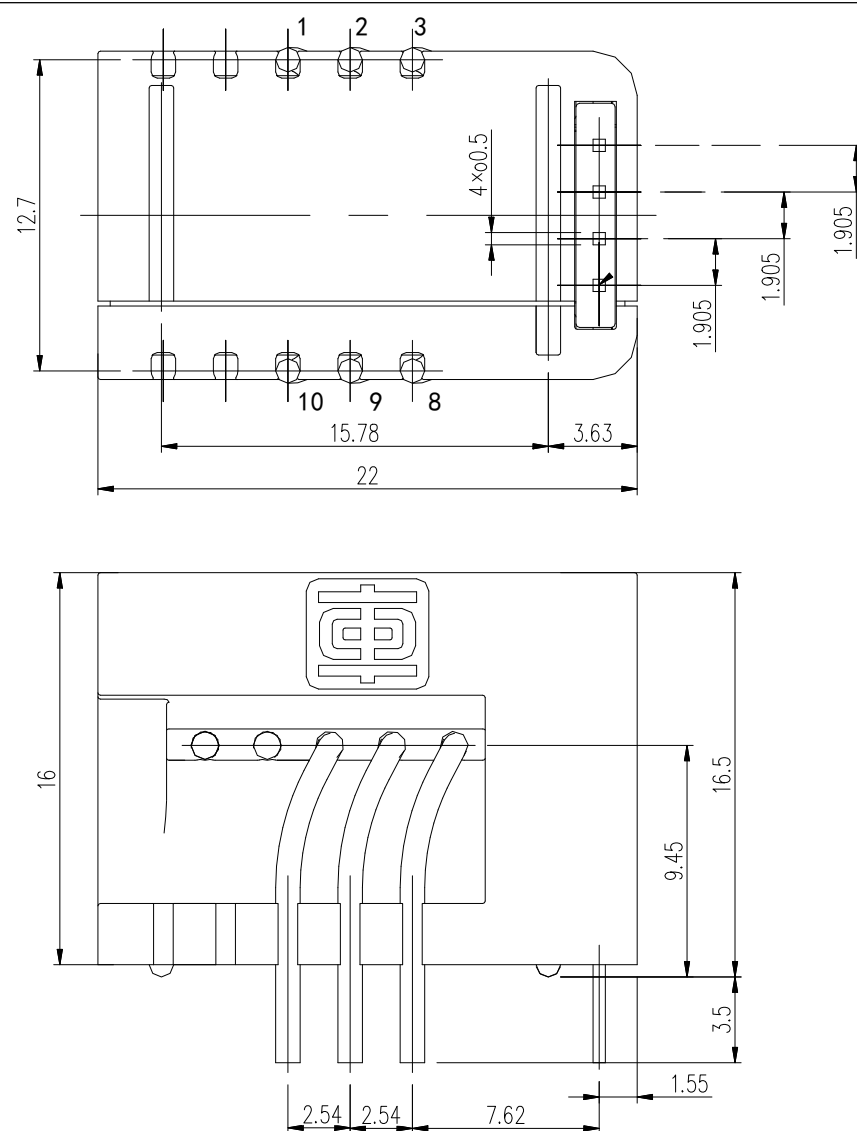
Parameter	Symbol	Unit	Specification	Conditions
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			Min	Typical	Max	
Primary current, nominal range	I_{PN}	A		50		RMS current
Primary current, measuring range	I_{PM}	A	-150		150	
Number of primary turns	N_P			1,2,3		
Supply voltage	U_C	V	4.75	5	5.25	
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°C
Temperature coefficient of V_{out} @ $I_P = 0A$	TCV_{OUT}	ppm/K		± 0.7	± 3	ppm/k of 2.5V, -40~105°C
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°C
Linearity error	ϵ_L	% of I_{PN}	-0.1		0.1	
Magnetic offset current ($10 \times I_{PN}$) referred to primary	I_{OM}	A	-0.1		0.1	
Step response time to 90 % of I_{PN}	t_r	μs			1	$R_L=1k\Omega$, $di/dt=50 A/\mu s$
Frequency bandwidth ($\pm 1dB$) ¹⁾	BW	kHz		± 200		$R_L=1k\Omega$
Accuracy @25°C	X	% of I_{PN}	-0.8		0.8	
Accuracy @105°C	X	% of I_{PN}	-1.3		1.3	
Overall accuracy @25°C	X	% of I_{PN}	-0.9		0.9	
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……

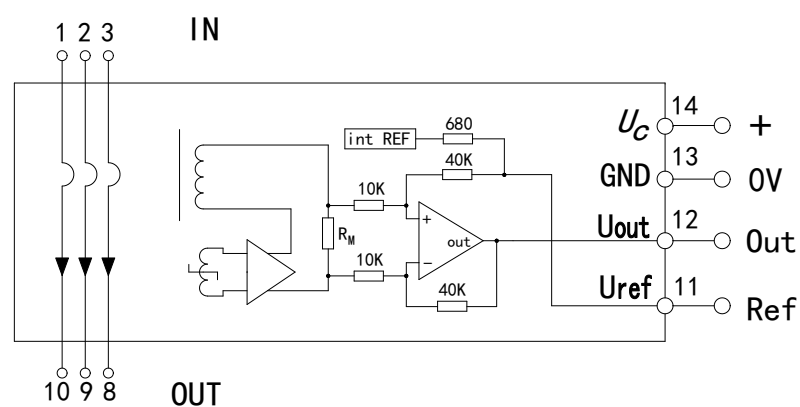
Dimensions(in mm)



Mechanical characteristics

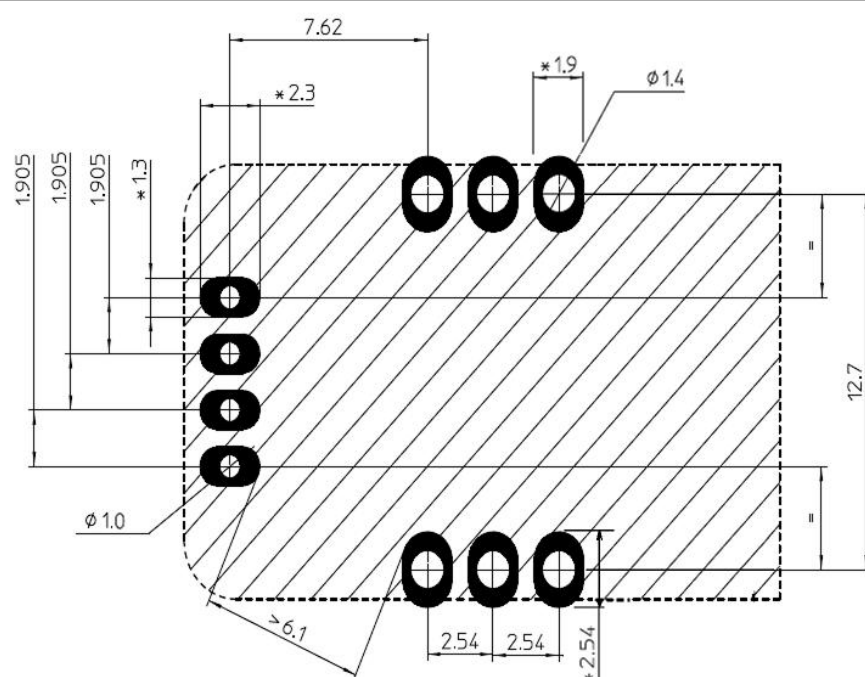
- Mass: $9g \pm 3g$
- General tolerance: $\pm 0.5mm$

Connection



PIN NO.	PIN NAME	Function
14	+U _c	Positive supply voltage
13	GND	Ground connection
12	V _{OUT}	Vout output voltage
11	V _{ref}	Internal reference output voltage.

PCB footprint according to the product (in mm)

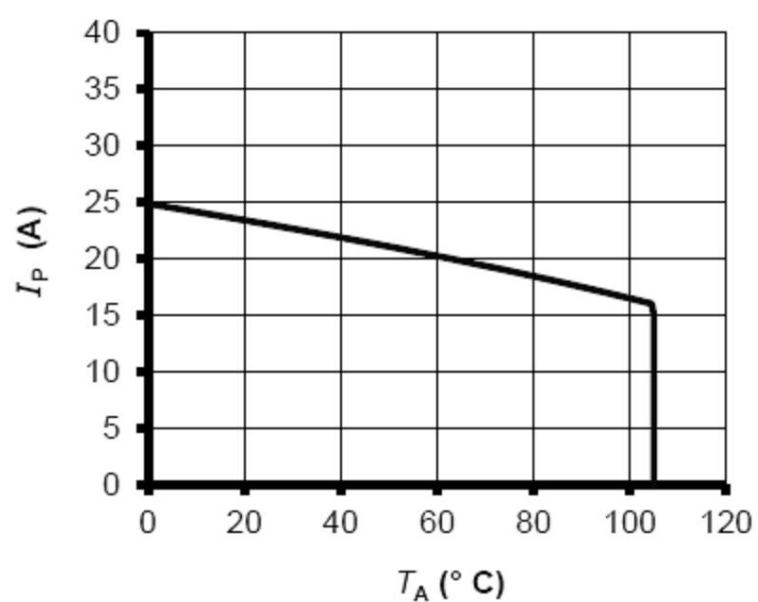


Note:

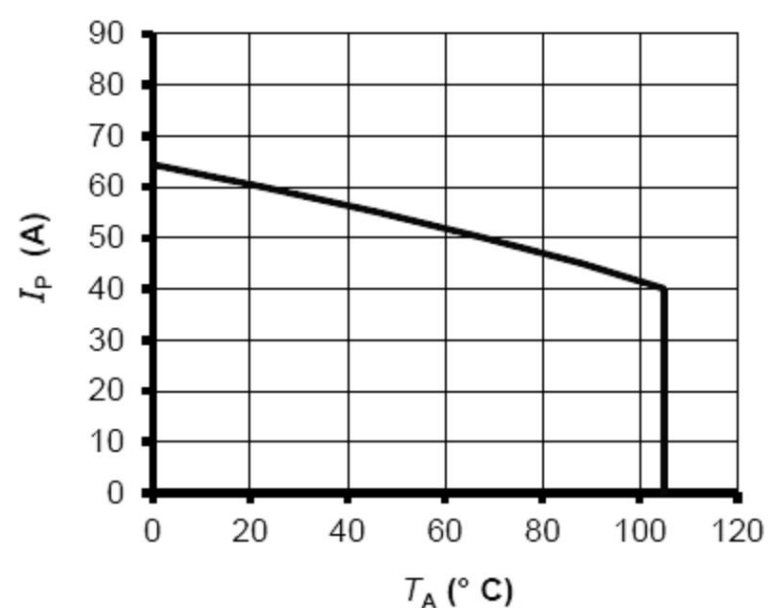
- Wave soldering profile: maximum 260°C for 10 seconds.
- Maximum PCB thickness: 2.5mm.
- Avoid primary tracks near the secondary area as it will reduce DCp/DCI.

Maximum continuous DC primary current

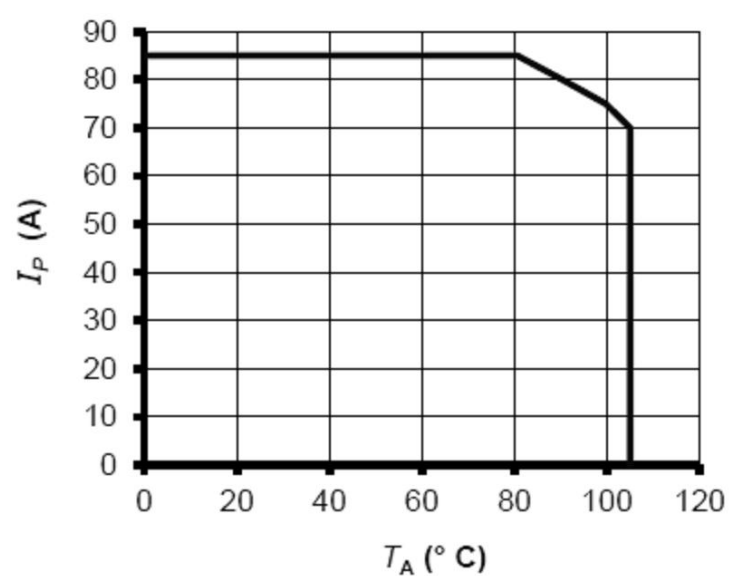
Maximum continuous DC primary current(@Uc=5V)



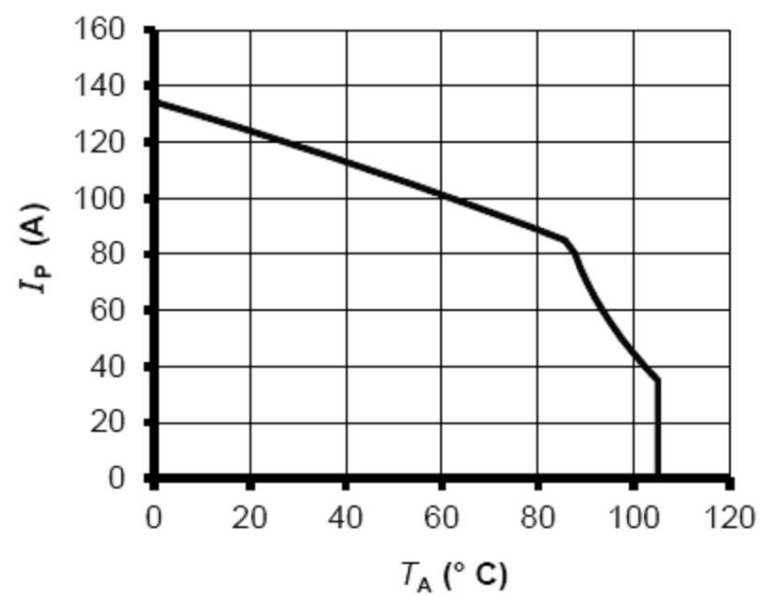
I_P VS T_A for NACGL.6T-P6/VN



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

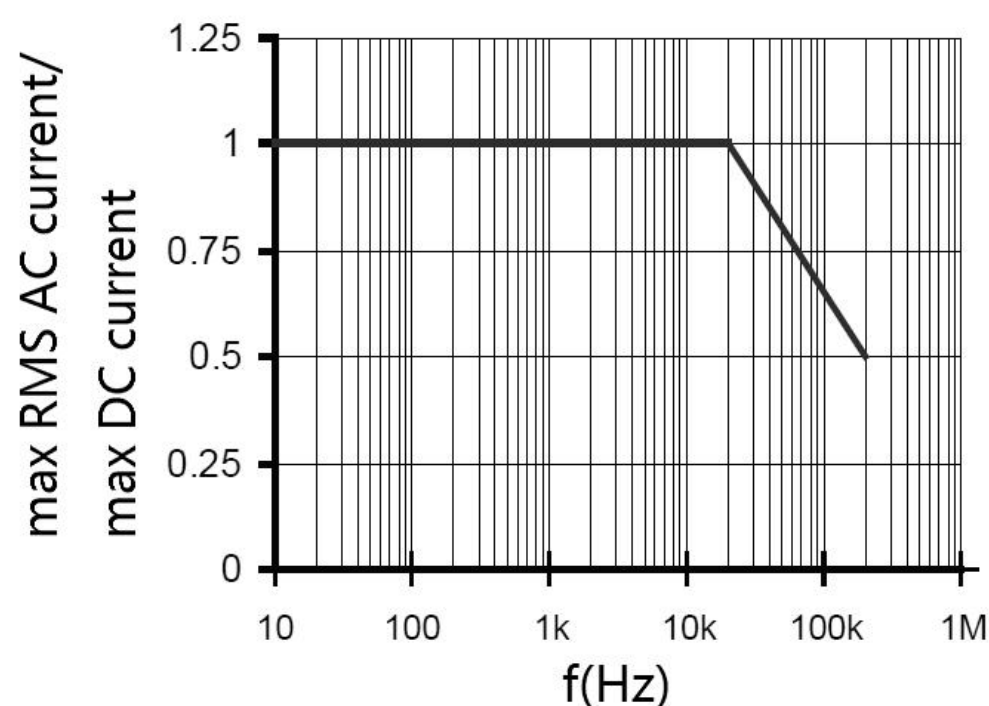
Note: the maximum continuous DC primary current plot shows the boundary of the area for which all the following conditions are true:

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

Frequency derating

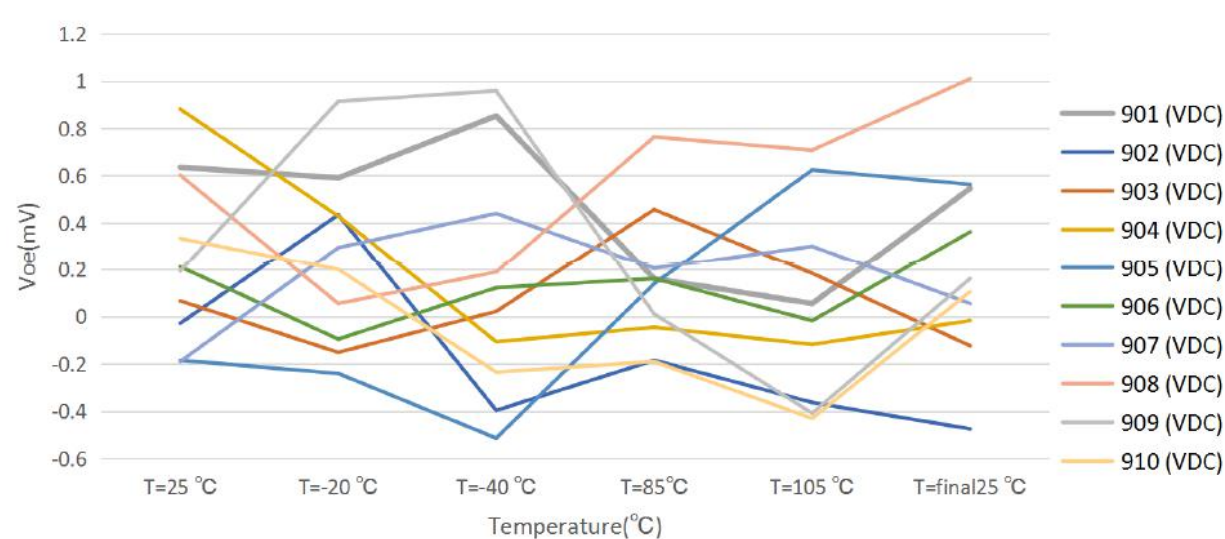
Maximum RMS AC primary current / maximum DC primary current VS frequency

AC Derating

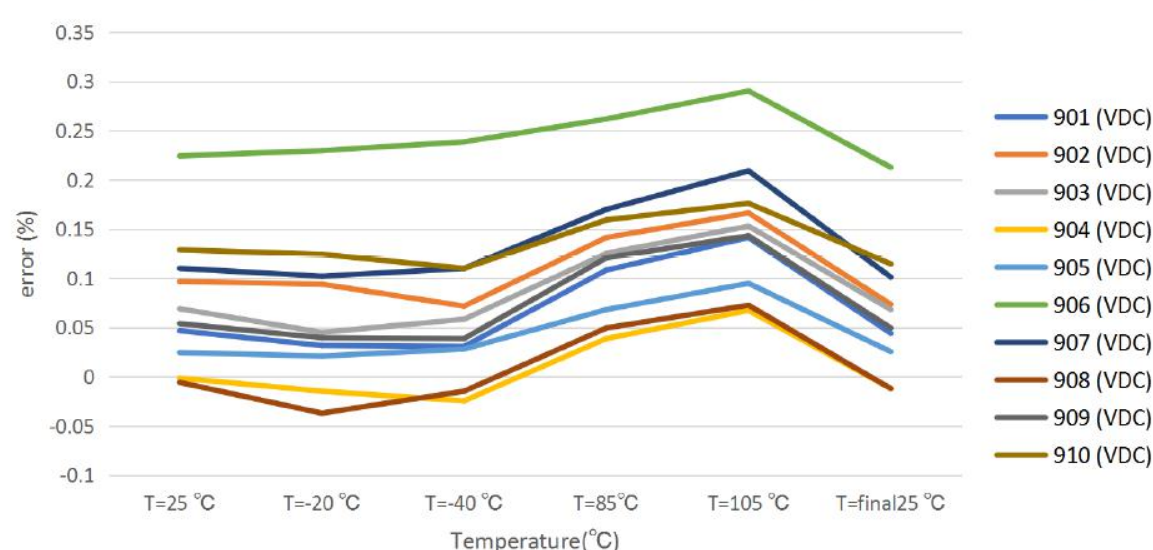


Typical performance characteristics

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.

- Product updates will not notified separately.The final version of the datasheet shall be confirmed through specific communication between both parties.