

# N1100 NFC Test System



**N1100\_ATE**



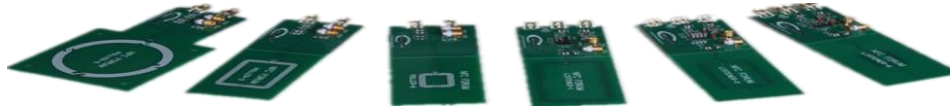
**N1100\_RnD**






**N1100\_Lab**



**Positioning Robot**



Reference Antenna

-  Multi hardware configuration to meet different test requirements.
-  Multi software panel to realize different test processes.
-  Open platform to build customized test softwares.

## ISO

- ISO 14443 Type A
- ISO 14443 Type B
- ISO 18092

## EMVco

- EMVco Type A
- EMVco Type B

## NFC Forum

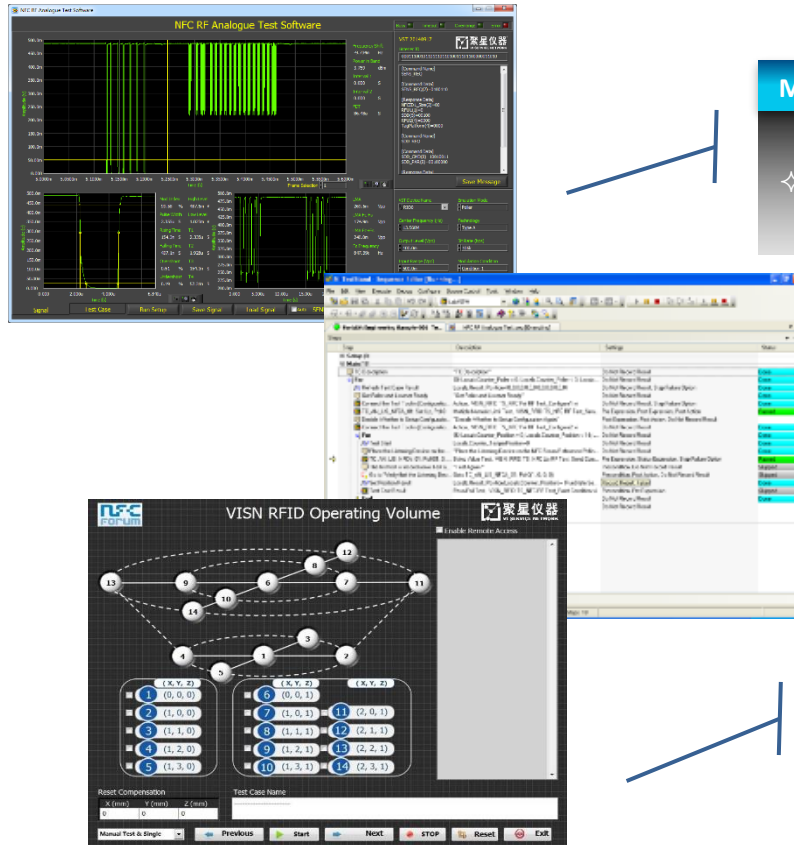
- NFC-A
- NFC-B
- NFC-F
- T1T
- T2T
- T3T
- T4AT
- T4BT
- P2P

## Approved Test System

RF Analogue Test



## NFC Test Software Panel



### Manual Test Front Panel

- ✦ N1100\_RnD, Research and Development Test

### Automatic Test Sequence

- ✦ N1100\_Lab, Laboratory Certification Test
- ✦ N1100\_ATE, Manufacture Test

### Operating Volume Control Panel

- ✦ N1100\_RnD, Research and Development Test
- ✦ N1100\_Lab, Laboratory Certification Test
- ✦ N1100\_ATE, Manufacture Test

There are three software test panels available for choosing to test NFC products under different hardware configurations.

- In the Manual Test Front Panel, all the hardware configurations, signal settings, real-time signal details and test results are showed on panel. The abundant settings are flexible for debugging the product under research and development.
- In the Automatic Test Sequence, all the required test cases are well organized and will run automatically in a very fast speed.
- In the Operating Volume Control Panel, the robot can be controlled either locally or remotely via ether net to move through all the selected test positions one by one.

	N1100_ATE	N1100_RnD	N1100_Lab
<b>RF Transmitter</b>			
Connector	MCX	SMA	SMA
Frequency Range	250kHz~40MHz	250kHz~40MHz	250kHz~40MHz
Frequency Accuracy	±100ppm	20ppm	3ppm
Output Signal Range	1 Vpk-pk	0.4Vpk-pk	0.4Vpk-pk
Absolute Maximum Output	±4 V per connector	10V	10V
Absolute Accuracy	0.8% FSR±15mV	±1dB	±1dB
SFDR	64dBc	69dBc (2dBm)	69dBc (2dBm)
Average Noise Density	-149dBm/Hz (4dBm,DC~50MHz)	-153dBm/Hz	-153dBm/Hz
<b>RF Receiver</b>			
Connector	MCX	SMA	SMA
Frequency Range	250kHz~40MHz	250kHz~40MHz	250kHz~40MHz
Frequency Accuracy	±100ppm	20ppm	3ppm
Impedance	50 Ω	50 Ω	50 Ω / 1M Ω
Input Signal Range	1 Vpk-pk	1.7Vpk-pk	10Vpk-pk
Absolute Maximum Input	±2 V, per connector	10V	10V
Absolute Accuracy	3.6% FSR±15mV	±1dB	0.65% FSR±1.6mV (2Vpk-pk)
SFDR	70dBc	75dBc	75dBc (2Vpk-pk)
Average Noise Density	-136dBm/Hz (10dBm,DC~50MHz)	-143dBm/Hz	-150dBm/Hz
Phase Noise Density at 10 kHz offset	-138dB/Hz	-148dB/Hz	<-130dB/Hz

Test Item	VISN Specification	Protocol Requirement	Unit
<b>Standard</b>	<b>ISO 14443 Type A/EMVco Type A/NFC-A</b>		
<b>Frequency</b>			
Center Frequency	13.56, adjustable	13.56	MHz
Frequency Accuracy	±1	±7	kHz
<b>Modulation</b>			
Command Modulation	ASK	ASK	
Modulation Depth/Index	100, adjustable	100	%
Response Modulation	Sub-carrier OOK	Sub-carrier OOK	
<b>RF Envelope</b>			
Power On/Off Time			us
Power On/Off Ripple			%
Power Off Level			%
Transition Time t1	38/fc~40.5/fc, adjustable	38/fc~40.5/fc	us
Transition Time t2	7/fc~36/fc, adjustable	7/fc~36/fc	us
Transition Time t3	3/fc~16/fc, adjustable	3/fc~16/fc	us
Transition Time t4	2/fc~6/fc, adjustable	2/fc~6/fc	us
Transition Ripple	<2.5	<10	%
Pulse Width	2.0-3.0, adjustable	2.0-3.0	us
Duty Cycle			%
<b>Data Coding</b>			
Command Coding	Modified Miller	Modified Miller	
Response Coding	Manchester	Manchester	
<b>Data Rate</b>			
Command Data Rate	106, 212, 424, 848	106, 212, 424, 848	kbps

Response Link Frequency			kHz
Response Data Rate	106, 212, 424, 848	106, 212, 424, 848	kbps
<b>Link Timing</b>			
Etu	9.44, adjustable	9.44	us
Turn-around Time T1	$(nx128+84)/fc$ , $(nx128+20)/fc$ , adjustable	$(nx128+84)/fc$ , $(nx128+20)/fc$	us
Turn-around Time T2			us
Turn-around Time T3			us
Turn-around Time T4			us
<b>Frame Structure</b>			
SOF	Sequence Z	Sequence Z	
EOF	Bit 0+Sequence Y	Bit 0+Sequence Y	
<b>Command Set</b>			
Mandatory Commands	All	REQA, WUPA, Anticollision, Select, HLTA, RATS, PPS, I-Block, R-Block, S-Block_wtx, S-Block_deselec	
Optional Commands			
<b>Tag Memory</b>			
Memory Content	All	UID_Size, Anticollision_Level, UID, BCC	
<b>Protocol State</b>			
State Transition	All	Idle, Ready, Active, Halt, Protocol	
<b>Standard</b>	<b>ISO 14443 Type B/EMVco TypeB/NFC-B</b>		
<b>Frequency</b>			
Center Frequency	13.56, adjustable	13.56	MHz
Frequency Accuracy	±1	±7	kHz
<b>Modulation</b>			
Command Modulation	ASK	ASK	

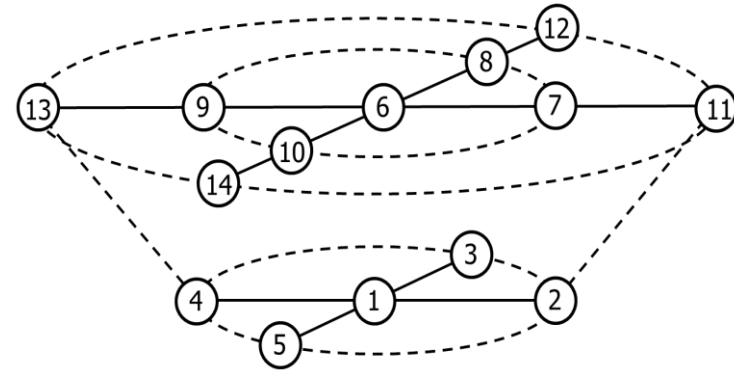
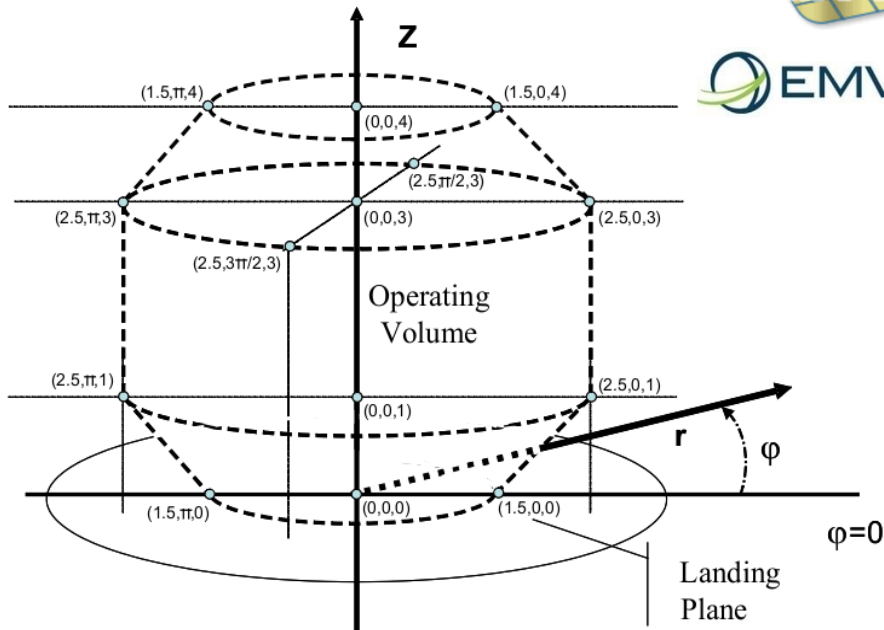
Modulation Depth/Index	15-25, adjustable	15-25	%
Response Modulation	Sub-carrier BPSK	Sub-carrier BPSK	
<b>RF Envelope</b>			
Power On/Off Time			us
Power On/Off Ripple			%
Power Off Level			%
Transition Time tr/tf	<16/fc, adjustable	<16/fc	us
Transition Ripple	<2.5	<10	%
Pulse Width	2.0-3.0, adjustable	2.0-3.0	us
Duty Cycle			%
<b>Data Coding</b>			
Command Coding	NRZ-L	NRZ-L	
Response Coding	NRZ-L	NRZ-L	
<b>Data Rate</b>			
Command Data Rate	106, 212, 424, 848	106, 212, 424, 848	kbps
Response Link Frequency			kHz
Response Data Rate	106, 212, 424, 848	106, 212, 424, 848	kbps
<b>Link Timing</b>			
Etu	9.44, adjustable	9.44	us
Turn-around Time T1	Max (256/fs)*2FWI, adjustable	Max (256/fs)*2FWI	us
Turn-around Time T2			us
Turn-around Time T3			us
<b>Frame Structure</b>			
SOF	10~11etu low+2~3etu high	10~11etu low+2~3etu high	
EOF	10~11etu low	10~11etu low	

Command Set			
Mandatory Commands	All	REQB, WUPB, Slot-MARKER, ATTRIB, HLTB, I-Block, R-Block, S-Block_wtx, S-Block_deselect	
Optional Commands			
Tag Memory			
Memory Content	All	PUPI, AFI, Protocol_Type, FWI, ADC, FO	
Protocol State			
State Transition	All	Idle, Ready_Requested, Ready_Declared, Protocol, Halt	
Standard	ISO 18092 (Sony Felica)/NFC-F		
Frequency			
Center Frequency	13.56, adjustable	13.56	MHz
Frequency Accuracy	±1	±7	kHz
Modulation			
Command Modulation	ASK	ASK	
Modulation Depth/Index	8~30, adjustable	8~30	%
Response Modulation	OOK	OOK	
RF Envelope			
Power On/Off Time			us
Power On/Off Ripple			%
Power Off Level			%
Transition Time tr/tf	<2.0, <1.0, adjustable	<2.0, <1.0	us
Transition Ripple	<2.5	<10	%
Pulse Width			us
Duty Cycle			%

Data Coding			
Command Coding	Manchester	Manchester	
Response Coding	Manchester	Manchester	
Data Rate			
Command Data Rate	212, 424	212, 424	kbps
Response Link Frequency			kHz
Response Data Rate	212, 424	212, 424	kbps
Link Timing			
Etu	4.72, 2,36, adjustable	4.72, 2,36	us
Turn-around Time T1	$(256*16/fc)*2^{WT}$ , adjustable	$(256*16/fc)*2^{WT}$	us
Turn-around Time T2			us
Turn-around Time T3			us
Turn-around Time T4			us
Frame Structure			
Preamble	48 Bit 0	48 Bit 0	
SYNC	B24D	B24D	
Command Set			
Mandatory Commands	All	Polling Request, Attribute Request, Wakeup Request, Parameter Selection Request, Data Exchange Protocol Request, Deselect Request, Release Request	
Optional Commands			
Tag Memory			
Memory Content	All	NFCID, Pad, TO	
Protocol State			
State Transition	All	Sense, Resolution, Selected, Sleep	



## Positioning Robot



Axial Load	.....	10kg
<b>X, Y, Z Axis</b>		
Positioning Range	.....	50mm
Positioning Accuracy	.....	<0.5mm
Speed	.....	<2.5mm/s
<b>T Axis</b>		
Rotating Range	.....	360°
Angle Resolution	.....	0.03°
Repeatability Accuracy	.....	<0.05°

## Test Case Examples

---NFC Forum RF Analogue Test

For Listening Device Test		
TC_AN_LIS_NFC-A/NFC-B/NFC-F	Power reception test for NFC-A/NFC-B/NFC-F at minimum conditions	<p><b>ensure that</b> The Listening Device functions properly within the Operating Volume of the NFC Forum Reference Polling Device.</p> <p><b>when</b> The minimum operating conditions have been established on the NFC Forum Reference Polling Device.</p>
TC_AN_LIS_NFC-A/NFC-B/NFC-F_02	Power reception test for NFC-A/NFC-B/NFC-F at nominal conditions	<p><b>ensure that</b> The Listening Device functions properly within the Operating Volume of the NFC Forum Reference Polling Device.</p> <p><b>when</b> The nominal operating conditions have been established on the NFC Forum Reference Polling Device.</p>
TC_AN_LIS_NFC-A/NFC-B/NFC-F_03	Power reception test for NFC-A/NFC-B/NFC-F at maximum conditions	<p><b>ensure that</b> The Listening Device functions properly within the Operating Volume of the NFC Forum Reference Polling Device.</p> <p><b>when</b> The maximum operating conditions have been established on the NFC Forum Reference Polling Device.</p>
TC_AN_LIS_UND_01	Loading effect measurement	<p><b>ensure that</b> The loading effect of the Listening Device does not exceed the voltage drop limit on the NFC Forum Reference Polling Device.</p> <p><b>when</b> The Listening Device is placed on the NFC Forum Reference Polling Device.</p>
TC_AN_LIS_UND_02	Carrier frequency test	<p><b>ensure that</b> The Listening Device under test is able to function correctly.</p> <p><b>when</b> The carrier frequency value is on the limits.</p>
TC_AN_LIS_NFC-A/NFC-B/NFC-F_04	Power On and Off test for NFC-A	<p><b>ensure that</b> The Listening Device under test is correctly reset.</p>

		<p>when</p> <p>The power level is reduced to VS,OV,RESET for a time tFIELD_OFF.</p>
TC_AN_LIS_NFCA_06	Modulation Polling Device to Listening Device at limit conditions – NFC-A/NFC-B/NFC-F	<p>ensure that</p> <p>The Listening Device under test is able to work correctly.</p> <p>when</p> <p>A polling command is sent with limit modulation characteristics.</p>
TC_AN_LIS_NFC-A/NFC-B/NFC-F_07	Load Modulation amplitude for NFC-A/NFC-B/NFC-F	<p>ensure that</p> <p>The amplitude of the load modulation of the Listening Device under test is greater than the limit.</p> <p>when</p> <p>The Listening Device under test is placed into the operating volume.</p>
TC_AN_LIS_NFC-A/NFC-B_08	Subcarrier Modulation – NFC-A/NFC-B	<p>ensure that</p> <p>The Listening Device under test is able to respond with right modulation type.</p> <p>when</p> <p>A polling command is sent normally.</p>
<b>For Polling Device Test</b>		
TC_AN_POL_UND_01	Minimum Power emission measurement	<p>ensure that</p> <p>The Polling Device under test provides RF field strength according to the minimum limit to power a Listening Device.</p> <p>when</p> <p>The Listening Device is placed into the operating volume.</p>
TC_AN_POL_UND_02	Maximum Power emission measurement	<p>ensure that</p> <p>The Polling Device under test provides RF field strength according to the maximum limit to power a Listening Device.</p> <p>when</p> <p>The Listening Device is placed into the operating volume.</p>
TC_AN_POL_UND_03	Carrier Frequency measurement	<p>ensure that</p> <p>The carrier frequency provided by the Polling Device under test is inside the minimum and maximum limits.</p> <p>when</p> <p>The polling device emits a carrier without any Modulation.</p>
TC_AN_POL_UND_04	Reset characteristics measurement	<p>ensure that</p> <p>The residual carrier amplitude and duration are compliant with the specification.</p>

		when The Polling Device under test is emitted a reset.
TC_AN_POL_UND_05	Threshold level test	ensure that The Polling Device under test is prevented from generating a carrier. when In a presence of another Polling Device already generating a carrier such that it will not cause interference.
TC_AN_POL_NFC-A/NFC-B/NFC-F_01	Modulation Polling Device to Listening Device – NFC-A/NFC-B/NFC-F	ensure that The Polling Device produces modulation characteristics that are within a Listening Device’s receiver capability. when The NFC Forum Reference Listening Device is placed into the operating volume.
TC_AN_POL_NFC-A/NFC-B/NFC-F_02	Load Modulation sensitivity test for NFC-A/NFC-B/NFC-F	ensure that The receiver of the Polling Device under test is sufficiently sensitive to be able to receive an NFC-A load modulation. when The NFC Forum Reference Listening Device is placed into the operating volume.

The N1100 NFC Tester is available from VI Service Network or the worldwide representatives.



Asia / Pacific	
Peritec	<a href="http://www.peritec.co.jp">www.peritec.co.jp</a>
Iwireless	<a href="http://www.iwireless.co.kr">www.iwireless.co.kr</a>
T&C	<a href="http://www.tctechinc.com">www.tctechinc.com</a>
Frontier	<a href="http://www.fitech.com.sg">www.fitech.com.sg</a>
America	
Nexjen	<a href="http://www.nexjen.com">www.nexjen.com</a>
Europe	
CISC	<a href="http://www.cisc.at">www.cisc.at</a>
Arcalc	<a href="http://www.arcale.net">www.arcale.net</a>