Transcom Instruments
Product Brochure

TSP Digital Scanner Specification and Applications

TRANSCOM
INSTRUMENTS

TSP Digital Scanner Specification and Applications

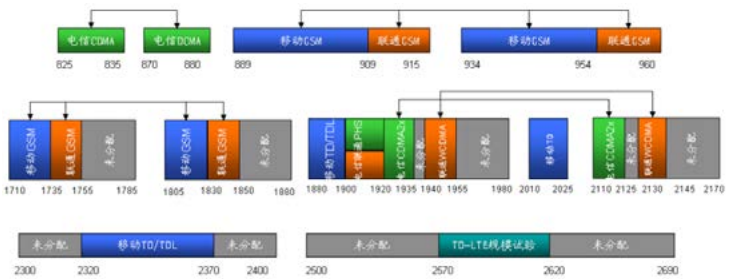
Specifications

TSP-H Scanner	
Frequency Range	9 MHz - 3 GHz
Channel Bandwidth	1.4 / 3 / 5 / 10 / 15 / 20 MHz
Antenna Techniques	SISO, SIMO, MIMO (2x2)
Measurement Rate	> 40 channel/sec （LTE @20M band）
	> 20 channel/sec （WCDMA/HSPA+）
	> 30 channel/sec （TD-SCDMA）
	> 70 channel/sec （CDMA2000/EVDO）
	> 80 channel/sec （GSM）
SIB Decoding	90% @ CINR > 0 dB
Co-Channel Cell Detection	≥ 25 dB
Dynamic Range (CINR)@ 20 MHz: RS	-23 to +40 dB
Min. Detection Level: RS RP	≤ -140 dBm (RSRP@ 20 MHz)
Relative Accuracy (CINR): RS	± 1 dB (Typical)
Maximum Input Power	≤ 10 dBm
Second Harmonic and Distortion threshold	≥ -15 dBm
Spectrum Noise Floor	≤ -130 dBm @ RBW=1.6KHz

Critical Spec - 1

Support Frequency Range: **9MHz – 3GHz** continuous wideband detection

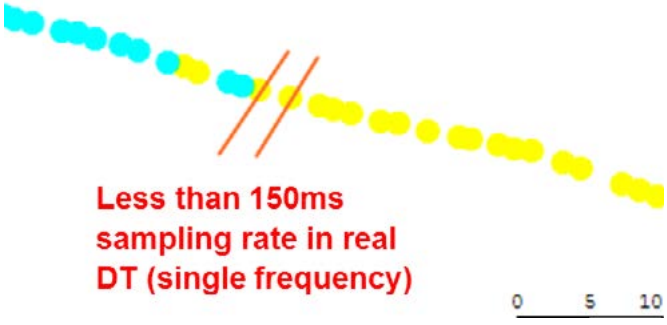
- Covering all major wireless standard frequency
- TSP support wideband scanning on all functions (coverage, spectrum and CW)



Critical Spec - 2

• Testing Speed: hundred millisecond detection speed

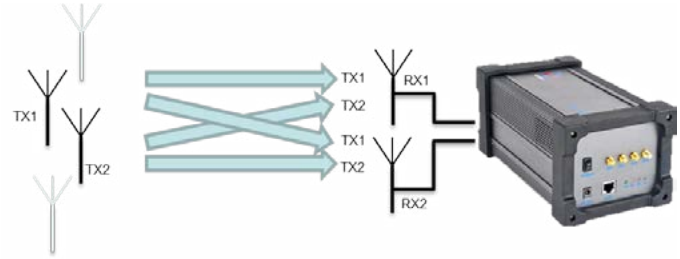
- Testing speed definition : how fast the scanner can detect single frequency PCI information
- Slow testing speed directly affected how many sample(s) collected. So you can’ t really know the real network coverage
- LTE testing speed is 60 channel/sec. 50% faster than others



Critical Spec 3

• Flexible antenna combination

- MIMO technologies require multi antenna technic to improve data throughput
- Scanner using MIMO matrix H technologies testing to calculate the performance gain of data streaming
- Leading position of antenna applications, TSP support SISO, SIMO and MIMO (2x2).

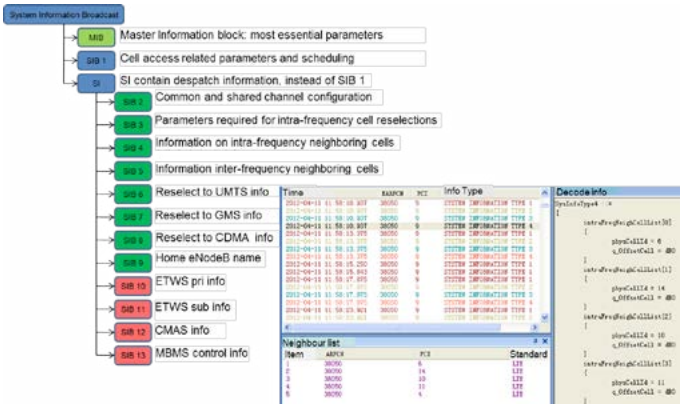


Critical Spec 4-1

• SIB Success Decoding Rate: >90%

- System Information Block (SIB) contents assist the UE when it is evaluating cell access and also defines the scheduling of other system information
- Only demodulate SIB 1 is require in normal situation. Demodulate/decoding SIB can identify the unique information of the sites. This avoid PCI duplication issue
- TSP scanner can achieve 90% successful decoding rate at CINR >0 situation, 2 to 3 times higher than competitor product

Critical Spec 4-2

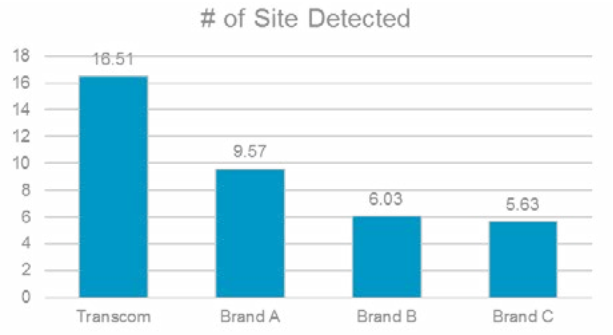


Critical Spec 4-2

• Co-channel decoding ability: >25dB

- This is the ability how good is the scanner to detect and demod/decode the co-channels information which is hide under the TopN signal
- The number of co-channel sites detected is solely depend on the scanner decoding ability. It also affect the real scenario of the sites if the decoding power is weak

-TSP scanner has the most advice technologies, it can provide >25dB of decoding power which is the market leader



Critical Spec 6

• Minimum Detection Level: ≤ -140dBm

- Detection level means the minimum signal level can correctly demod the require information
- The lower the level, the more signal can detect and reflect the real scenario of the site
- TSP scanner min. detection level is ≤ -140dBm

Critical Spec 7

• Second harmonic saturation and distortion threshold: Satisfy Spectrum Cleaning

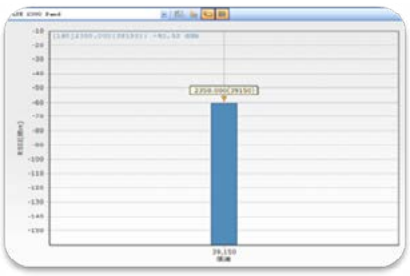
- Apply a testing freq exceeds the front end amplifier threshold , it will generate second harmonic saturation mutation distortion occurs.
- Higher the threshold value in the scanner, the lower the chances the scanner go into second harmonic distortion when impact by a strong signal.
- TSP scanner has ≥-15dBm second harmonic distortion saturation threshold . This is tested in spectrum cleaning and significantly better than the professional spectrum analyser performance.

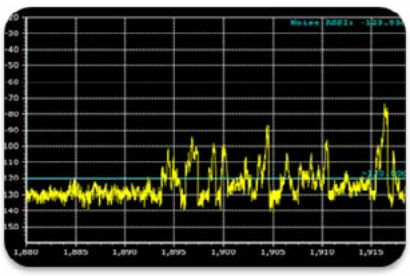
Hardware

Hardware functions	Applications
Concurrent data collection across multi-technologies and bands	Increase testing efficiency
Increase testing efficiency	Increase accuracy of cell detection and neighbour site relationship
Blind scanning functions	High speed blind scanning on full band and channel detection
Simultaneous spectrum and scanning	In spectrum mode, analyse the known signal which causing interference
GPS pre-searching	Increase GPS searching success rate
Data auto storage and upload to cloud	Real time upload data collected to server, cloud and big data analysis
Self-checking	Self testing on antenna system before DT

Software functions	Applications
Reporting and Statistic function	Supporting trajectorie, statistic charts, Tables and Google earth data analysis
Coverage analysis and testing	Coverage, poor coverage report, Overlapping, Overshooting, back coverage, Pilot pullution, multi-network analysis
Interference analysis and testing	Primary Pilot interference, Mod3/6/30 interference, co-channel interferences, time-slot interference
Neighbour site analysis	Number of neighbour sites report, mismatch list, lost list, wrong neighbour list, CSFB analysis, verification on multi-network neighbour site list
Site analysis	Sites coverage level map, site coverage/interference map, primary pilot coverage/interference map
Special functions	GPS loss/sync, multipath testing, layer 3 analysis

Scanner application





CW Testing
- Propagation Modeling

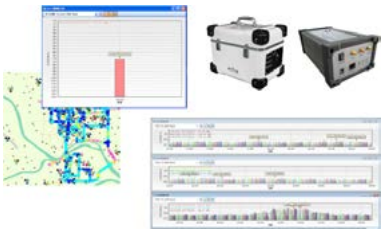
Spectrum
- Spectrum clearing
- Interference detection

Coverage testing
- Coverage
- interference
- Neighbour site
- Multi-network

Network Planning: Propagation model optimization

• Propagation model is an empirical mathematical formulation for the characterization of radio wave to predict the path loss along a link and the effective coverage.

$$m(x) = \frac{1}{2l}\int_{x-l}^{x+l} r(y)dy$$

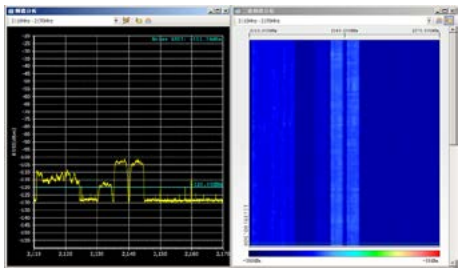


• According to Dr. William C.Y.Lee' s theory: In order to identify the local environment of slow decline trend signal propagation, at 30 to 50 sampling rate is needed when 2L is 40λ. It is effectively "eliminate fast fading and reserve slow fading" on the signal. This achieve the propagations model calibration purpose.

Network Planning: Propagation model optimization

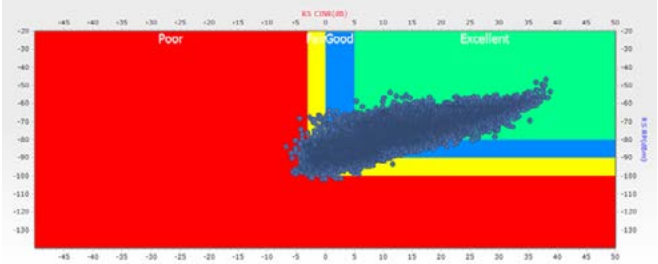
• During network planning, using scanner to scan the new site area to identify any interference. This call spectrum cleaning

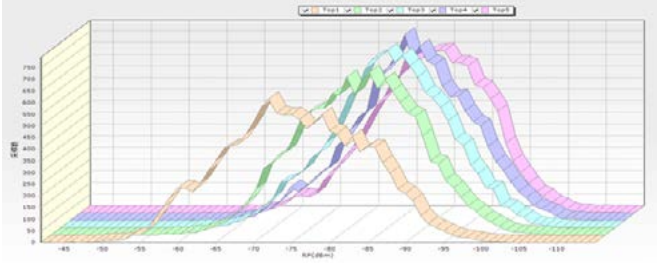
- RSSI tarjectories map
-Interference index chart
-Frequency band statistic
-SPAN=0 testing mode
-Uplink time slot interference



Coverage optimization

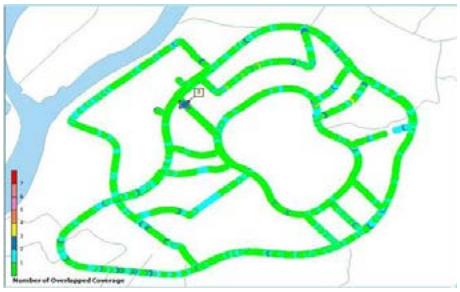
• Road coverage optimization
- Poor coverage
- Pilot pollution
- Overshooting
- Multi-antenna coverage
- Antenna Back lobe
-Indoor leakage





• Network Structure Optimization

- Road overlapping analysis
- Cell overlapping analysis
- Cell overshooting analysis



CellID	小区名称	经度	纬度	EARFCN	PCI	TAC	CI	方位角	小区重叠覆盖度
50660514	SJQII1028	114.41221	38.03091	38350	361	12500	50660514	60	8.00
50615297	SJQII0349	114.41119	38.02209	38350	186	12500	50615297	90	7.00
50803970	SJTH02227	114.49164	37.99406	38350	460	13003	50803970	180	7.00
50466818	SJTH00337	114.49469	37.99042	38350	171	13003	50466818	60	7.00
50787074	SJCHA2161	114.57127	38.07494	38350	395	12498	50787074	270	6.17
50470402	SJQID0177	114.49467	38.02372	39100	123	12796	50470402	60	6.00
50790913	SJCHA2176	114.52500	38.10060	38350	478	12382	50790913	190	6.00
50401537	SJQII0456	114.46734	37.98138	38350	411	12379	50401537	60	5.00

CellID	小区名称	经度	纬度	EARFCN	PCI	TAC	CI	方位角	小区冗余覆盖度
50898688	SJQII0856	114.46314	37.98957	38950	359	12380	50898688	0	100.00%
50664193	SJQII03000	114.46404	37.98687	38350	204	12379	50664193	90	100.00%
50417665	SJQII0182	114.46686	37.97789	38350	426	12379	50417665	60	100.00%
50587650	SJQII0755	114.42602	38.05661	38100	129	12853	50587650	0	100.00%
50693632	SJQII0302	114.47366	38.03106	38100	310	12861	50693632	60	100.00%
50378241	SJIIN0562	114.41134	38.07608	38350	159	13000	50378241	60	100.00%
50791936	SJCHA2180	114.57486	38.07154	38350	379	12498	50791936	180	100.00%
50002177	SJQII2220	114.42804	38.00375	38350	263	12300	50002177	300	100.00%

• Co-channel Interference

PCI = (3 X NID1) + NID 2

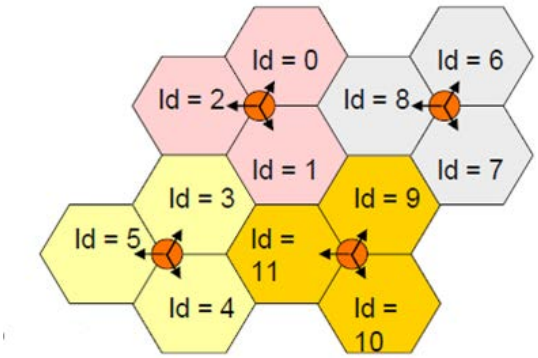
NID1: Second Synchronization Signal (0 – 167)

NID2: Primary Sync Signal (0-2)

PCI mod 3: PSS interference if PCI mod 3 value the same

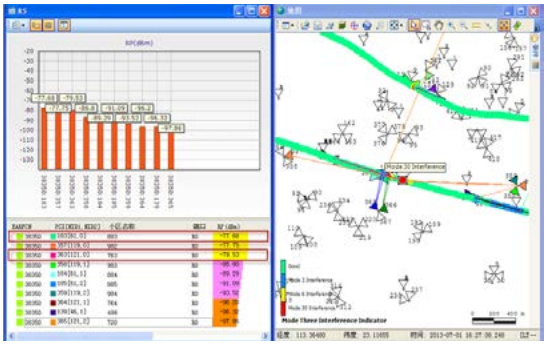
PCI mod 6: 6 vshift value on DL timeslot, if same PCI mod6 value occur. This cause DL RS interrupt (same Antenna)

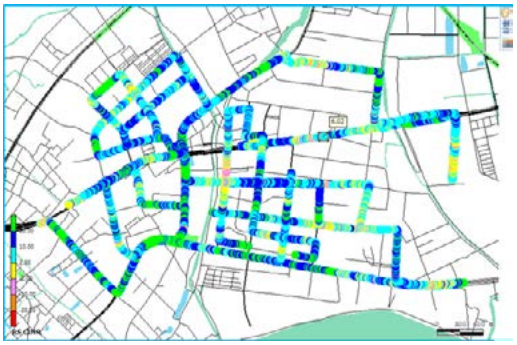
PCI mod30: PUSCH consist of DM-RS and SRS information. Is represent by 30 sets of ZC sequence. If PCI mod30 have same value, this will affect the UL DMRS and SRS.



• Co-channel Interference

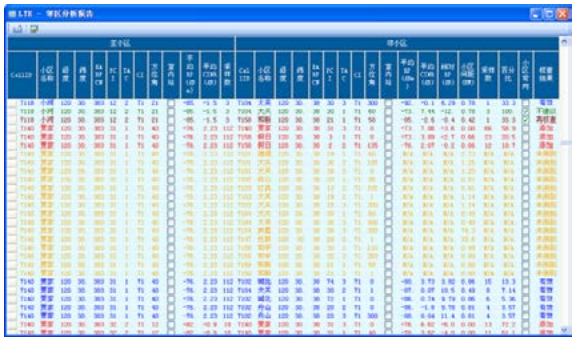
- Mod3/6/30 analysis
- PCI simulation
- CINR analysis

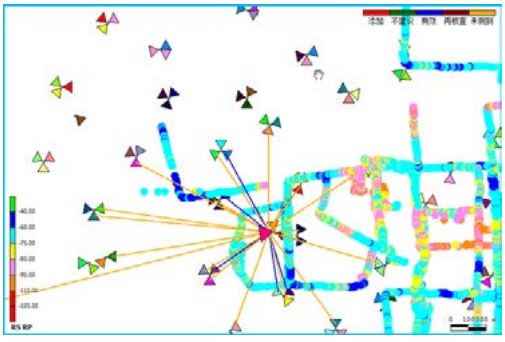




• Neighbours site optimization

- System neighbour site
- Non-system neighbour site
- Neighbour site planning base on CSFB (Circuit Switch FeedBack) info
- Spider web analysis

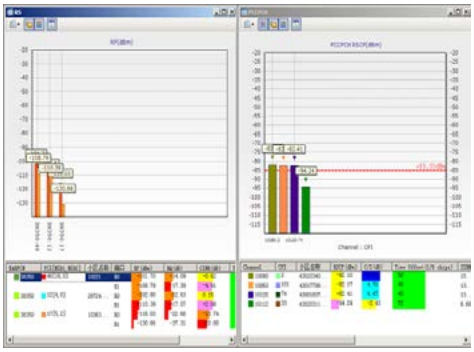


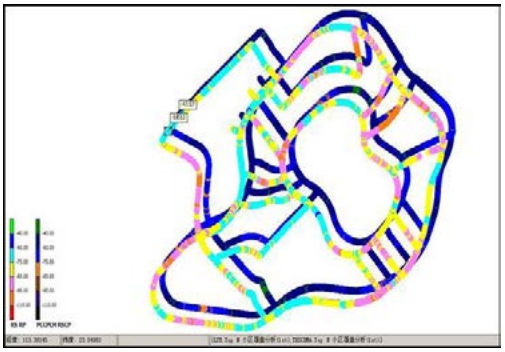


• Multi-Technology Correlation Analysis

Displaying:

- Multi -traces and charts
- Coverage verification & analysis tables
- Neighboring cell verification & analysis tables
- Co-location multi-tech cell analysis table

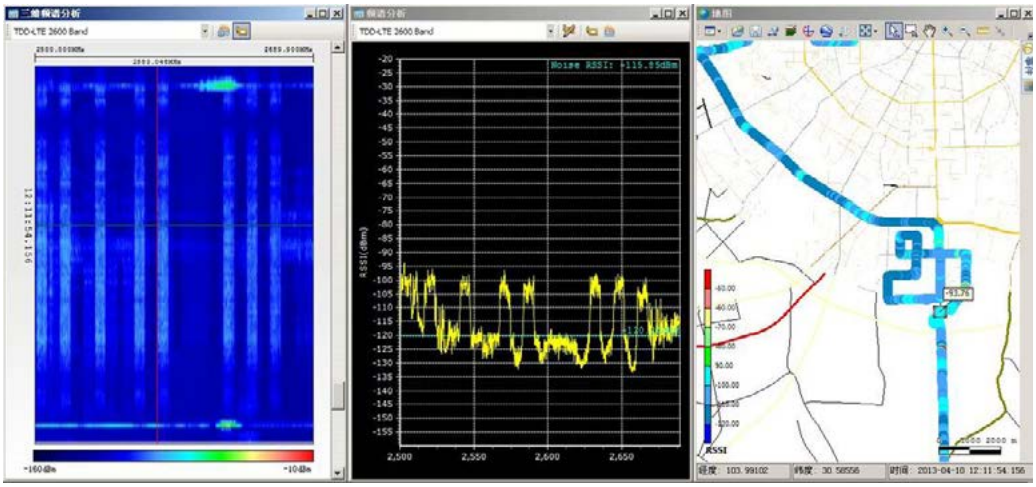




Case study 1: Spectrum Cleaning

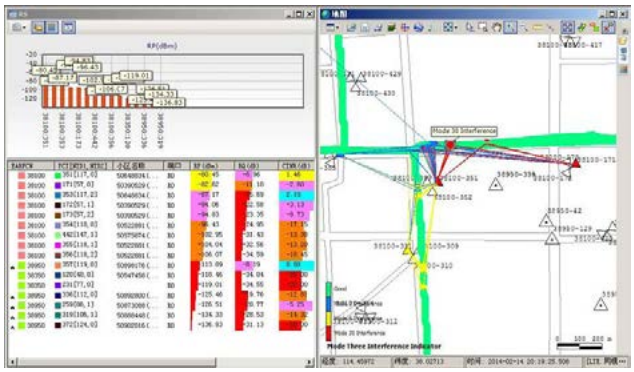
Interference at 2500-2690MHz

• During testing, a 8MHz bandwidth signal appear regularly spread out the spectrum. After investigation, this is a repeater signal from a broadcast company.



Case study 2: Co-channel interference

Co-channel interference verification map, sites analysis report can be generated by setting RSRP ≥ -95dBm, CINR <0, below TopN signal is 6dB. This cell analysis reports is suitable for double screening and investigation.



Additional analysis: PCI can be batch modify to simulate the result and compare the result after modification. This function can help engineer to understand the result will be before actually modify the PCI.

Case Study 3: Co-located site field strength different

•Co-located antenna or Multi-band antennas system is common used today. In normal condition, different technologies should have the similar field strength and coverage. Certain coverage and overlapping must be guarantee. Too large different in technologies are non-rational.

• Using data gathered from multiple network during same DT. A field strength differential report in multi network can be generate to reflect antenna coverage rationality.

After PCI change

Keep innovating for excellence!

About Transcom

Shanghai Transcom Instrument Co., Ltd. (NEEQ: 831961), established in 2005, independently research and develop high-end radio frequency communication testing instruments and is a professional provider of overall testing solutions. Starting from 2009, Transcom, titled as National High-Tech Enterprise and the fostered enterprise by Shanghai Little Giant Project, has undertaken the tasks of development for National "New-Generation Broadband Wireless Mobile Communication Network" and the construction of Shanghai Engineering Research Center for Wireless Communication Testing Instruments.

In 2015, Transcom officially announced its new five-year development strategy "1+3" . In detail, Transcom will continue to enhance its potential to be the national team for domestic wireless communication instruments, and develop security software for mobile communication network (network communication/data mining), wireless signal (spectrum monitoring/situation analysis) and Beidou navigation (signal monitoring for satellite navigation/mobile anti-jam verification platform). The strategy has now been implemented systematically with progressive achievements in Shanghai, Guangdong and other cities.

Keep innovating for excellence!

ISO9001 ISO14001

Headquarter
6F,Buliding29,No.69 Guiqing Road,Xuhui District,SHANGHAI,PRC.200233
Tel:+86 21 6432 6888
Fax:+86 21 6432 6777
Hotline:400 6778077
Mail:info@transcom.net.cn
www.transcom.net.cn

Beijing office
Room 512,513,geology building, No.13 Peace Street, Chaoyang District, BEIJING,PRC.100013
Tel:010-84263611
Fax:010-82051758

Guangzhou office
Room 1004, Houhe building,No.77 Zhongshan Road, Tianhe District, GUANGZHOU,PRC.510630
Tel:020-38846191/38846192/ 38846190
Fax:020-38846191-603

Shenzhen office
Room 726,Lankun Building,No.213 Minkang Road, Nanshan District,SHENZHEN,PRC.518131
Tel:0755-26509997
Fax:0755-26509995

Chendu office
Room 403,Unit 1,Keller international Building 3, No.14 Ninehing Road,Hi Tech District, CHENGDU,PRC.610042
Tel:028-83227390
Fax:028-85120797

Xi'an office
Room 1101,Jiatian building 2,Kechuang Road,Yanta District,XI'AN,PRC.710065
Tel:029- 88240745
Fax:029- 88227690

company profile wechat