

TEST REPORT





DT&C Co., Ltd.

42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 17042

Tel : 031-321-2664, Fax : 031-321-1664

1. Report No : DRTFCC1709-0168(1)
2. Customer
 - Name : POINTMOBILE CO.,LTD
 - Address : B-9F, Kabul Great Valley 32 Digital-ro 9-gil, Geumcheon-gu Seoul South Korea
153-709
3. Use of Report : FCC & IC Original Grant
4. Product Name / Model Name : Mobile Computer / FCC: PM80, IC: PM80PW
FCC ID: V2X-PM80W1 / IC: 10664A-PM80W1
5. Test Method Used : ANSI C63.10-2013
Test Specification : FCC Part 15.225
RSS-210 Issue 9 (2016-04), RSS-GEN Issue 4 (2014-11)
6. Date of Test : 2017.03.16 ~ 2017.04.27
7. Testing Environment : See appended test report.
8. Test Result : Refer to the attached test result.

Affirmation	Tested by	Technical Manager
	Name : JaeHyeok Bang 	Name : HyunSu Son 

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of DT&C Co., Ltd.

2017 . 09 . 13 .

DT&C Co., Ltd.

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

Test Report Version

Test Report No.	Date	Description
DRTFCC1709-0168	Sep. 06, 2017	Initial issue
DRTFCC1709-0167(1)	Sep.13, 2017	Update the Customer information

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1. General Information

1.1. Testing Laboratory

DT&C Co., Ltd.		
Standard	Site number	Address
FCC	<input checked="" type="checkbox"/> 165783	42, Yurim-ro 154 beon-gil, Cheoin -gu, Yongin-si, Gyeonggi -do, South Korea 449-935
	<input type="checkbox"/> 804488	42, Yurim-ro 154 beon-gil, Cheoin -gu, Yongin-si, Gyeonggi -do, South Korea 449-935
	<input type="checkbox"/> 596748	42, Yurim-ro 154 beon-gil, Cheoin -gu, Yongin-si, Gyeonggi -do, South Korea 449-935
	<input type="checkbox"/> 678747	683-3, Yubang-dong, Cheoin-gu, Yongin-si, Kyeonggi-do, Korea, 449-080
IC	<input checked="" type="checkbox"/> 5740A-3	42, Yurim-ro 154 beon-gil, Cheoin -gu, Yongin-si, Gyeonggi -do, South Korea 449-935
	<input type="checkbox"/> 5740A-2	683-3, Yubang-dong, Cheoin-gu, Yongin-si, Kyeonggi-do, Korea, 449-080
www.dtn.net		
Telephone	:	+ 82-31-321-2664
FAX	:	+ 82-31-321-1664

1.2. Testing Environment

Ambient Condition	
▪ Temperature	+22 ~ 23 °C
▪ Relative Humidity	40 % ~ 45 %

1.3. Measurement Uncertainty

Test items	Measurement uncertainty
AC conducted emission	2.4 dB (The confidence level is about 95 %, k = 2)
Radiated spurious emission (1 GHz Below)	5.1 dB (The confidence level is about 95 %, k = 2)

1.4. Details of Applicant

Applicant : POINT MOBILE CO.,LTD
 Address : B-9F, Kabul Great Valley 32 Digital-ro 9-gil, Geumcheon-gu Seoul South Korea
 : 153-709
 Contact person : Wilson Park

1.5. Description of EUT

FCC Equipment Class	Low Power Communications Device Transmitter(DXX)
EUT	Mobile computer
Model Name	FCC: PM80 IC: PM80PW
Add Model Name	FCC: CHD8, XT2 IC: XT2PW
Serial Number	Identical prototype
Hardware version	MP
Software version	81.00
Power Supply	DC 3.8 V
Frequency Band	13.56 MHz
Modulation Type	ASK
Channel(s)	1
Antenna type	Loop Antenna

2. Information about test items

2.1 Test mode

Test mode1	Continuous transmitting mode
Test mode2	-

Note: For this test mode, a test program was supported by manufacturer.

2.2 Support equipment

Equipment	Model No.	Serial No.	Manufacturer	Note
-	-	-	-	-

2.3 Tested frequency

Channel	TX Frequency(MHz)	RX Frequency(MHz)
Lowest	13.56	13.56
Middle	-	-
Highest	-	-

2.4 EMI Suppression Device(s)/Modifications

EMI suppression device(s) added and/or modifications made during testing
 → None

3. Antenna requirements

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

The antenna is attached to the battery cover, and it is coupled use the special tension.(Refer to Internal photo file)
 Therefore this E.U.T Complies with the requirement of §15.203

4. Test report

4.1 Summary of tests

FCC part section(s)	RSS section(s)	Parameter	Limit	Test condition	Status Note 1
2.1049	-	20 dB Bandwidth	-	Radiated	C
-	RSS-Gen [6.6]	Occupied Bandwidth	-		C
15.225 (a)	RSS-210 [B6(a)]	In-Band Emissions	15,848 $\mu\text{V}/\text{m}$ @ 30 m 13.553 – 13.567 MHz		C
15.225 (b)	RSS-210 [B6(b)]	In-Band Emissions	334 $\mu\text{V}/\text{m}$ @ 30 m 13.410 – 13.553 MHz 13.567 – 13.710 MHz		C
15.225 (c)	RSS-210 [B6(c)]	In-Band Emissions	106 $\mu\text{V}/\text{m}$ @ 30 m 13.110 – 13.410 MHz 13.710 – 14.010 MHz		C
15.225 (d) 15.209	RSS-210 [B6(d)] RSS-GEN [8.9]	Out-of Band Emissions	Emissions outside of the specified band (13.110-14.010 MHz) must meet the radiated limits detailed in 15.209		C
15.225 (e)	RSS-210 [B6]	Frequency Stability	± 0.01 % of operating frequency	Temp & Humid Test Chamber	C
15.207	RSS-Gen [8.8]	AC Conducted Emissions	FCC Part 15.207	AC Line Conducted	C
15.203	-	Antenna Requirements	FCC Part 15.203	-	C

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable

The sample was tested according to the following specification:
ANSI C-63.10-2013

4.2 Transmitter requirements

4.2.1 20dB bandwidth

- Procedure:

The 20 dB Bandwidth is measured with a spectrum analyzer connected via a receive antenna placed near the EUT while the EUT is operating in transmission mode.

- Measurement Data: Comply



- Minimum Standard: NA

4.2.2 Occupied bandwidth

- Procedure:

The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth (RBW) shall be in the range of 1 % to 5 % of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3 x RBW.

- Measurement Data: Comply



- Minimum Standard: NA

4.2.3 In-band emissions

- Procedure:

The EUT was placed on a 0.8 m high non-conductive table inside a 3 m semi anechoic chamber. An antenna was placed at 3 m distance from the EUT. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

- Measurement Data: Comply

Tested Frequency : 13.56 MHz
 Measurement Distance : 3 Meters

Test Frequency Band [MHz]	Freq. [MHz]	EUT Posi.	ANT Pol (Note 1)	Reading Level [dBuV]	T.F [dB/m]	Field Strength @3 m [dBuV/m]	Field Strength @30 m [dBuV/m]	Limit [dBuV/m]	Margin [dB]
13.110 ~ 13.410	13.348	Z	F	24.50	20.21	44.71	4.71	40.51	35.80
13.410 ~ 13.553	13.550	Z	F	34.40	20.22	54.62	14.62	50.47	35.85
13.553 ~ 13.567	13.559	Z	F	42.20	20.22	62.42	22.42	84.00	61.58
13.567 ~ 13.710	13.568	Z	F	33.50	20.22	53.72	13.72	50.47	36.75
13.710 ~ 14.010	13.772	Z	F	23.40	20.23	43.63	3.63	40.51	36.88

Note 1. This test item was performed using a loop antenna.

“F”: = Facing the antenna / “T” = antenna shifted / turned 90s degrees [Loop antenna]

Note 2. This test item was performed at 3 m and the data were extrapolated to the specified measurement distance of 30 m using the square of an inverse linear distance extrapolation factor (40 dB/decade) as specified in §15.31(f)2.

▪ Extrapolation Factor = $20 \log_{10}(30/3)^2 = 40 \text{ dB}$

Note 3. All data were recorded using a spectrum analyzer employing a peak detector.

If PK results were meet Quasi-peak limit, Quasi-peak measurements were omitted.

Note 4. Sample Calculation.

Margin = Limit – Field Strength @ 30 m / Field Strength @ 30 m = Field Strength @ 3 m – 40 dB

Field Strength @ 3 m = Reading + T.F / T.F = AF + CL – AG

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

- Minimum Standard: Part 15.225(a), (b), (c)& RSS-210 [B6(a), (b), (c)]

Frequency Band [MHz]	Limit	
	[uV/m]	[dBuV/m]
13.553-13.567	15,848	84.00
13.410-13.553 13.567-13.710	334	50.47
13.110-13.410 13.710-14.010	106	40.51

4.2.4 Out-of-band emissions

- Procedure:

The EUT was tested from 9 kHz up to the 1 GHz excluding the band 13.110-14.010 MHz. All measurements were recorded with spectrum analyzer employing a peak detector for emissions below 30 MHz. Above 30 MHz a Quasi-peak detector was used. All out-of-band emissions must not exceed the limits §15.209. A loop antenna was used for searching for emissions below 30 MHz.

- Measurement Data: **Comply**

Tested Frequency : 13.56 MHz
 Measurement Distance : 3 Meters

Frequency [MHz]	EUT Posi.	ANT Pol (Note 1)	Reading [dBuV]	T.F [dB/m]	Distance factor [dB]	Field Strength [dBuV/m]	Limit [dBuV/m]	Margin [dB]
0.033	Z	F	39.7	19.58	80	-20.72	37.2	57.92
0.044	Z	F	44.7	19.58	80	-15.72	34.7	50.42
0.055	Z	F	35.3	19.57	80	-25.13	32.8	57.93
0.124	Z	F	35.9	19.51	80	-24.59	25.7	50.29
1.358	Z	F	19.7	19.84	40	-0.46	25	25.46
3.113	Z	F	25.9	19.94	40	5.84	29.5	23.66
3.429	Z	F	25.0	19.95	40	4.95	29.5	24.55
30.243	Z	V	39.0	-18.79	0	20.21	40	19.79
877.726	Z	H	34.9	-2.95	0	31.95	46	14.05

Note 1. "F": = Facing the antenna / "T" = antenna shifted / turned 90s degrees [Loop antenna]

"H": = Horizontal / "V" = Vertical [Bilog antenna]

Note 2. All measurements were recorded using a spectrum analyzer employing a peak detector for below 30 MHz and a Quasi-peak detector for above 30 MHz.

Note 3. No other spurious and harmonic emissions were reported greater than listed emissions above table.

Note 4. Sample calculation

Margin = Limit – Field Strength

Field Strength = Reading + T.F – Distance factor

T.F = AF + CL – AG

Distance factor = $20\log(\text{Measurement distance} / \text{The measured distance})^2$

Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain

- Minimum Standard: Part 15.209, 225(d) & RSS-210[B6(d)], RSS-GEN[8.9]

• FCC Part 15.209(a):

Frequency [MHz]	Field Strength [uV/m]	Measurement Distance [Meters]
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30	30	30
30 ~ 88	100 **	3
88 ~ 216	150 **	3
216 ~ 960	200 **	3
Above 960	200	3

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

• FCC Part 15.209(b):

In the emission table above, the tighter limit applies at the band edges.

4.2.5 Frequency Stability

- Procedure:

Part 15.225 requires that devices operating in the 13.553 – 13.567 MHz shall maintain the carrier frequency within 0.01 % of the operating frequency over the temperature variation of -20 degrees to + 50 degrees C at normal supply voltage.

- Measurement Data: Comply

Operating Frequency : 13,560,000 Hz

VOLTAGE (%)	POWER (V _{DC})	TEMP (°C)	Frequency (Hz)	Freq. Dev. (Hz)	Deviation (%)
100%	3.800	+20(ref)	13,559,319	-681	0.005023
100%		-20	13,559,342	-658	0.004853
100%		-10	13,559,356	-644	0.004749
100%		0	13,559,363	-637	0.004698
100%		+10	13,559,353	-647	0.004772
100%		+20	13,559,319	-681	0.005023
100%		+30	13,559,321	-679	0.005008
100%		+40	13,559,316	-684	0.005045
100%		+50	13,559,308	-692	0.005104
115%		4.370	+20	13,559,326	-674
BATT.ENDPOINT	3.500	+20	13,559,322	-678	0.005000

- Minimum Standard: Part 15. 225(e) & RSS-210 [B6]

The frequency tolerance of the carrier signal shall be maintained within ± 0.01 % of the operating frequency.

4.2.6 AC Line Conducted Emissions

- Test Requirements and limit

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs for the actual connections between EUT and support equipment.

TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

- **Measurement Data: Comply** (refer to the next page)

Measurement Data

Results of Conducted Emission

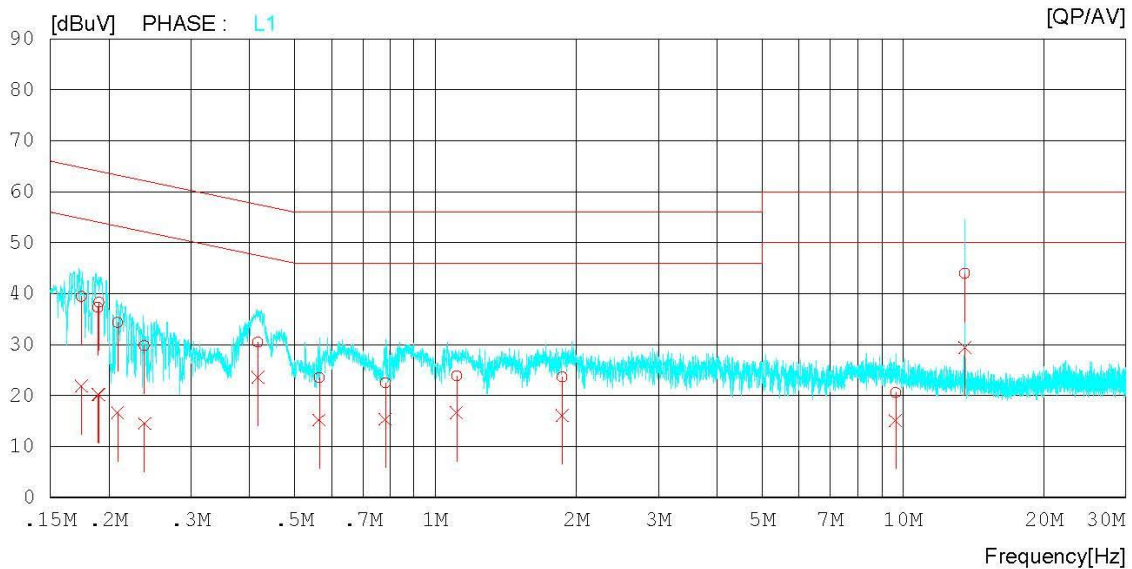
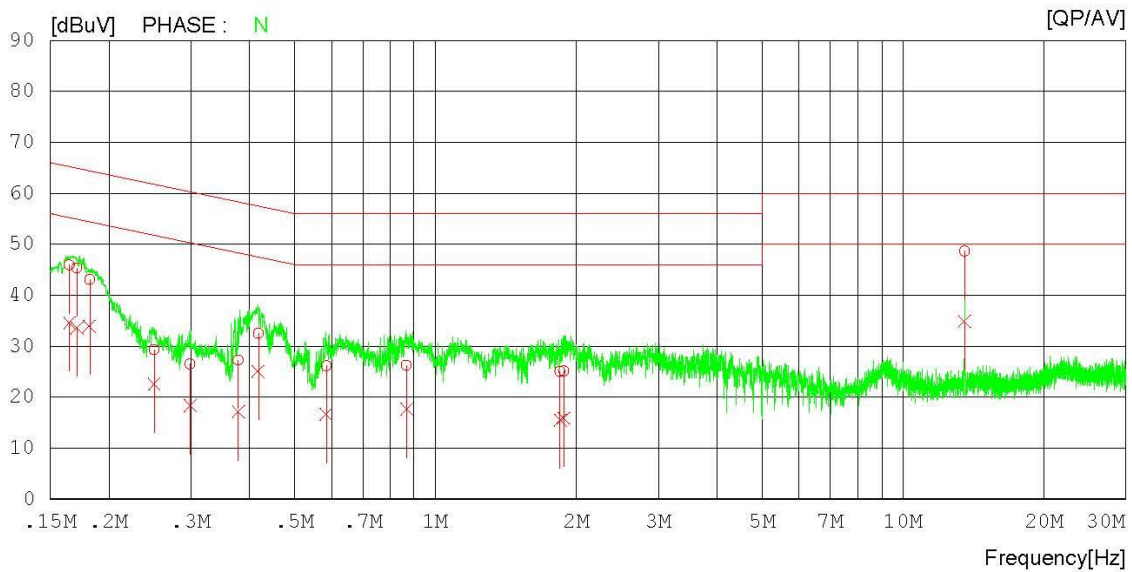
DTNC

Date : 2017-04-27

Order No. : DTNC1703-01704 :
 Power Supply : AC 120V 60Hz :
 Temp/Humi : 23 °C / 45 % :
 Test Condition : NFC :

Memo :

LIMIT : CISPR class B QP
 CISPR class B AV



Measurement Data

Results of Conducted Emission

DTNC

Date : 2017-04-27

Order No. : DTNC1703-01704 :
 Power Supply : AC 120V 60Hz :
 Temp/Humi : 23 °C / 45 % :
 Test Condition : NFC :

Memo :

LIMIT : CISPR class B QP
 CISPR class B AV

NO	FREQ [MHz]	READING		C. FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]			
1	0.16475	35.7	24.4	10.2	45.9	34.6	65.2	55.2	19.3	20.6	N
2	0.17125	35.2	23.4	10.2	45.4	33.6	64.9	54.9	19.5	21.3	N
3	0.18185	32.9	23.7	10.2	43.1	33.9	64.4	54.4	21.3	20.5	N
4	0.25015	19.1	12.4	10.2	29.3	22.6	61.8	51.8	32.5	29.2	N
5	0.29872	16.2	8.1	10.2	26.4	18.3	60.3	50.3	33.9	32.0	N
6	0.37861	17.1	6.9	10.2	27.3	17.1	58.3	48.3	31.0	31.2	N
7	0.41776	22.3	14.9	10.2	32.5	25.1	57.5	47.5	25.0	22.4	N
8	0.58358	15.9	6.5	10.2	26.1	16.7	56.0	46.0	29.9	29.3	N
9	0.86692	16.1	7.5	10.2	26.3	17.7	56.0	46.0	29.7	28.3	N
10	1.84860	14.7	5.2	10.3	25.0	15.5	56.0	46.0	31.0	30.5	N
11	1.88380	14.8	5.6	10.3	25.1	15.9	56.0	46.0	30.9	30.1	N
12	13.55880	37.5	23.7	11.1	48.6	34.8	60.0	50.0	11.4	15.2	N
13	0.17474	29.3	11.8	10.1	39.4	21.9	64.7	54.7	25.3	32.8	L1
14	0.18975	27.2	10.1	10.1	37.3	20.2	64.0	54.0	26.7	33.8	L1
15	0.19043	28.2	10.0	10.1	38.3	20.1	64.0	54.0	25.7	33.9	L1
16	0.20893	24.1	6.5	10.1	34.2	16.6	63.2	53.2	29.0	36.6	L1
17	0.23851	19.7	4.4	10.1	29.8	14.5	62.1	52.1	32.3	37.6	L1
18	0.41738	20.2	13.3	10.2	30.4	23.5	57.5	47.5	27.1	24.0	L1
19	0.56378	13.3	5.0	10.2	23.5	15.2	56.0	46.0	32.5	30.8	L1
20	0.78085	12.3	5.1	10.2	22.5	15.3	56.0	46.0	33.5	30.7	L1
21	1.11060	13.7	6.4	10.2	23.9	16.6	56.0	46.0	32.1	29.4	L1
22	1.86540	13.3	5.7	10.3	23.6	16.0	56.0	46.0	32.4	30.0	L1
23	9.64080	9.8	4.3	10.8	20.6	15.1	60.0	50.0	39.4	34.9	L1
24	13.56440	32.8	18.3	11.1	43.9	29.4	60.0	50.0	16.1	20.6	L1

APPENDIX

TEST EQUIPMENT FOR TESTS

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	16/08/18	17/08/18	MY46471601
Spectrum Analyzer	Agilent Technologies	N9020A	16/10/11	17/10/11	MY46471251
Multimeter	FLUKE	17B	17/04/12	18/04/12	26030065WS
DC Power Supply	Agilent	66332A	17/01/11	18/01/11	US37473831
Signal Generator	Rohde Schwarz	SMBV100A	17/01/04	18/01/04	255571
Thermohygrometer	HCT	HCT-1	16/09/09	17/09/09	NONE
Loop Antenna	Schwarzbeck	FMZB1513	16/04/22	18/04/22	1513-128
BILOG ANTENNA	Schwarzbeck	VULB 9160	16/11/11	18/11/13	3151
PreAmplifier	TSJ	MLA-010K01-B01-27	17/03/06	18/03/06	1844539
EMI Test Receiver	Rohde Schwarz	ESR7	17/02/16	18/02/16	101061
EMI TEST RECEIVER	R&S	ESCI	17/02/26	18/02/16	100364
PULSE LIMITER	Rohde Schwarz	ESH3-Z2	17/01/03	18/01/03	101334
SINGLE-PHASE MASTER	NF	4420	16/09/08	17/09/08	3049354420023
Temp & Humi Test Chamber	SJ Science	TEMI850-10	17/01/25	18/01/25	SJ-TH-S50-120203
Artificial Mains Network	Narda S.T.S. / PMM	PMM L2-16B	16/06/22	17/06/22	000WX20305