

GENERAL DESCRIPTION

The EM92600/1A series are developed for 46/49 MHz of 10 channels band frequency of cordless telephone which is used in U.S.A.. These devices are dual phase-locked loop frequency synthesizers contained ROM counters for receive and transmit loops with two independent phase detect circuits. A common reference oscillator and reference divider are share by the receive and transmit circuits.

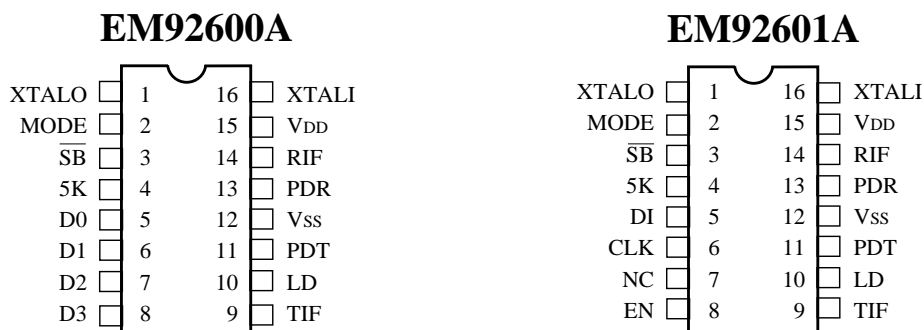
Other features include a lock detect circuit for the transmit loop, illegal code default, a buffered oscillator output for mixing purposes in the system, 5KHz tone output . The EM92601A is designed for easy MPU interface. It provides the same features as the EM92600A , but accepts channel programming via a clocked, serial input instead of parallel BCD inputs. The EM92600A is selected channels via mechanical switches of parallel BCD input.

FEATURES

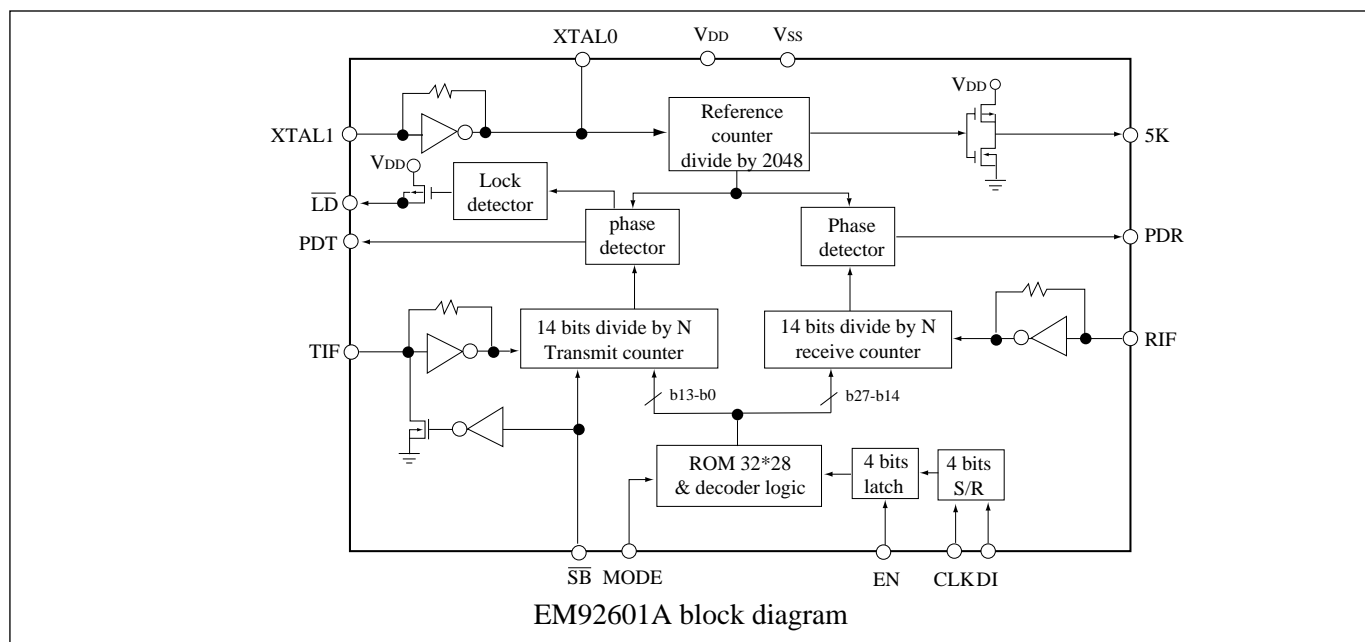
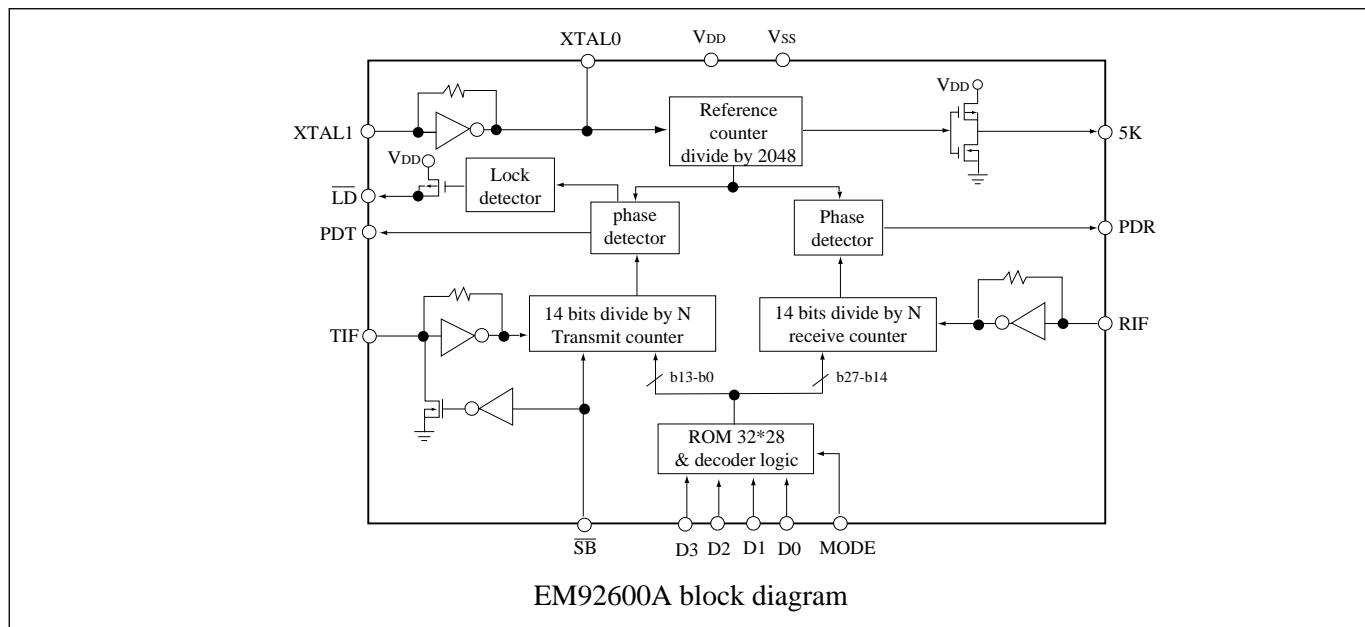
- Include oscillation circuit with external X-TAL (10.240 MHz).
- Unlock detector.
- 5KHz output for guard tone.
- Standby mode for power saving.
- 2.5 to 5.5V supply range.
- Basetset/Handset changeable.
- Available in 16 pin DIP or SOP.
- SERIES

| Part Number | Package | Channel Selection |
|-------------|---------|-------------------|
| EM92600AP | DIP | parallel |
| EM92600AM | SOP | parallel |
| EM92601AP | DIP | serial |
| EM92601AM | SOP | serial |

PIN ASSIGNMENTS



FUNCTIONAL BLOCK DIAGRAM



PIN DESCRIPTIONS

| Symbol | Pin No. | Function |
|-----------------|---------|--|
| XTALO | O | This output generates reference frequency when it is connected to pin 16 with external OSC of which frequency is 10.240MHz |
| MODE | I | Base/remote changing. Internal pull down. V_{DD} =base, V_{SS} =remote. |
| \overline{SB} | I | The standby pin is used to save power when no transmit. Internal pull down. High: transmit and receive active Low: receive acts only |
| 5K | O | The signal derived from the reference oscillator. 5KHz output. |

| Symbol | I/O | Function |
|------------------------|-----|--|
| D0 | I | The channel selected pin. LSB.(internal pull down) |
| D1 | I | The channel selected pin. (internal pull down) |
| D2 | I | The channel selected pin. (internal pull down) |
| D3 | I | The channel selected pin. MSB.(internal pull down) |
| Di | I | The serial input data pin. |
| CLK | I | Clock input. Each low to high transition of the clock shifts one bit of data into the on-chip shift register. |
| NC | - | Not connect. |
| EN | I | The enable pin controls the data transfer from the shift register to the 4-bit latch. A low to high transition latches the data. |
| TIF | I | Input to programmable divider of Tx. AC coupling with VCO. Min input voltage is 200mVpp. |
| $\overline{\text{LD}}$ | O | Unlock detector output. V_{DD} level: unlock. |
| PDT | O | Phase detector output for Tx. PDT detects the phase error from Tx PLL and its output is connected to external low pass filter. |
| V_{SS} | - | Ground. |
| PDR | O | Phase detector output for Rx. PDR detects the phase error from Rx PLL and its output is connected to external low pass filter. |
| RIF | I | Input of programmable divider for Rx.AC coupling with VCO. Min input voltage is 200mVpp. |
| V_{DD} | - | Power supply. |
| XTAL1 | I | To connect crystal (10.240MHz) and capacitor. |

ABSOLUTE MAXIMUM RATINGS

| Symbol | Rating | Value | Unit |
|-------------------|--|----------------------|------|
| V_{DD} | DC supply voltage | -0.5 to +6 | V |
| V_{IN} | Input voltage | -0.5 to $V_{DD}+0.5$ | V |
| I_{IN}, I_{OUT} | DC current drain per pin | 10.0 | mA |
| I_{DD}, I_{SS} | DC current drain V_{DD} or V_{SS} pins | 30.0 | mA |
| T_A | Operating temperature range | -30 to +75 | °C |
| T_{STG} | Storage temperature range | -65 to +150 | °C |

DC ELECTRICAL CHARACTERISTICS

($T_A = 25^\circ\text{C}$ unless otherwise noted)

| Parameter | Sym. | Min. | Typ. | Max. | Unit | Condition |
|---|----------------------|--------------|--------|-----------|---------------|--|
| Operating voltage | V_{DD} | 2.5 | - | 5.5 | V | |
| Input voltage | V_{IL} V_{IH} | 2.2 | - | 0.8 | V | $V_{DD}=3V$ |
| Output voltage | V_{OL} V_{OH} | 2.95 | - | 0.05 | V | $V_{DD}=3V$ |
| Input low current | I_{IL} | -36 -0.06 | - - | | μA | $v_{IL}=0$ pin 16,14,9 pin 2~8 |
| Input high current | I_{IH} | | - - | 36 120 | μA | $v_{IH}=V_{DD}-0.5V$ pin 16,14,9 pin 2~8 |
| Output current | I_{OH} I_{OL} | -0.2 0.2 | - - | | mA | $V_{OH}=2.6V$ $V_{OL}=0.4V$ |
| Standby current | I_{DS} | | - | 1.5 | mA | $V_{DD}=3V$, note1 |
| Operating current (0.2Vp-p input at RIF,TIF) | I_{DO} | | - | 3.0 | mA | $V_{DD}=3V$, note2 |
| 3-state leakage current | I_{OZ} | | - | ± 1 | μA | $V_{DD}=5V$ |

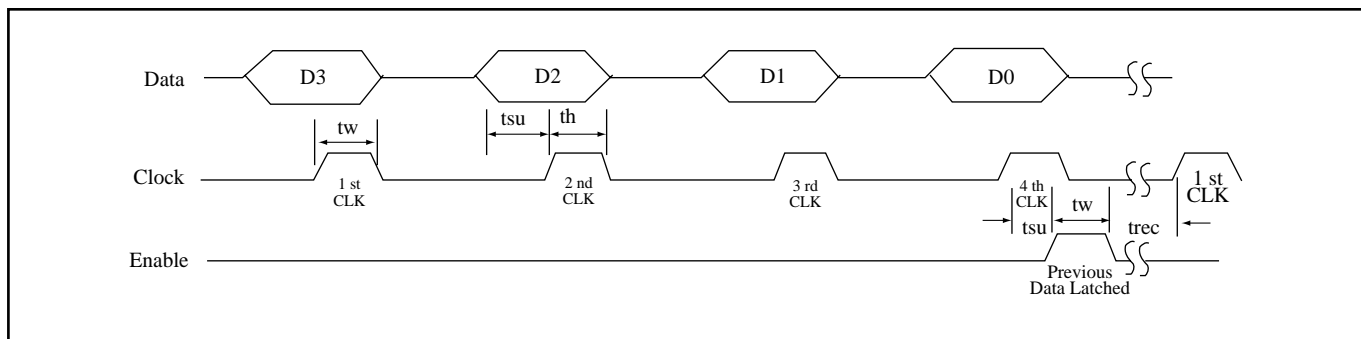
Note 1: XTALin: 10.24MHz ; MODE: V_{DD} ; \overline{SB} : V_{SS} ; TIF=20MHz(200 mVp-p); RIF=40MHz(200 mVp-p); others are open.

Note 2: XTALin: 10.24MHz ; MODE: V_{DD} ; \overline{SB} : V_{DD} ; TIF=20MHz(200 mVp-p); RIF=40MHz(200 mVp-p); others are open.

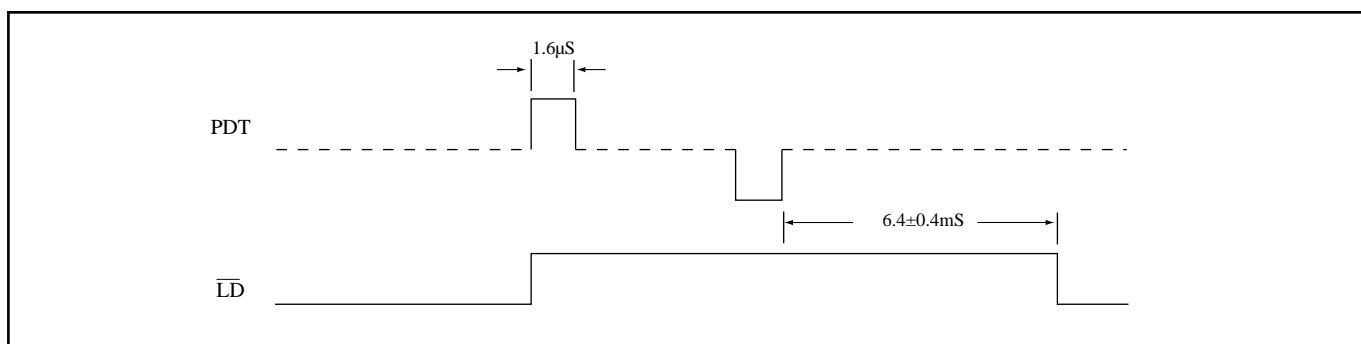
AC ELECTRICAL CHARACTERISTICS

| Parameter | Sym. | Min. | Typ. | Max. | Unit | Condition |
|---|----------------|------------|------|----------------|---------------|-------------------------------------|
| Output rise time | T_R | | | 200 | nS | $V_{DD}=3V$ |
| Output fall time | T_F | | | 200 | nS | $V_{DD}=3V$ |
| Input rise and fall time OSC in | T_R T_F | | | 5 | μS | XTAL1 $V_{DD}=3V$ |
| Maximum frequency input =sine wave 0.2Vp-p | F_{MAX} | | | 12 50 50 | MHz | XTAL1 RIF ($V_{DD}=3V$) TIF |
| Setup time data to clock Enable to clock | T_{SU} | 100 200 | | | nS | EM92601A only |
| Hold time clock to data | T_H | 80 | | | nS | EM92601A only |
| Recovery time Enable to clock | T_{REC} | 80 | | | nS | EM92601A only |
| Input pulse width clock and Enable | T_W | 80 | | | nS | EM92601A only |

TIMING DIAGRAM

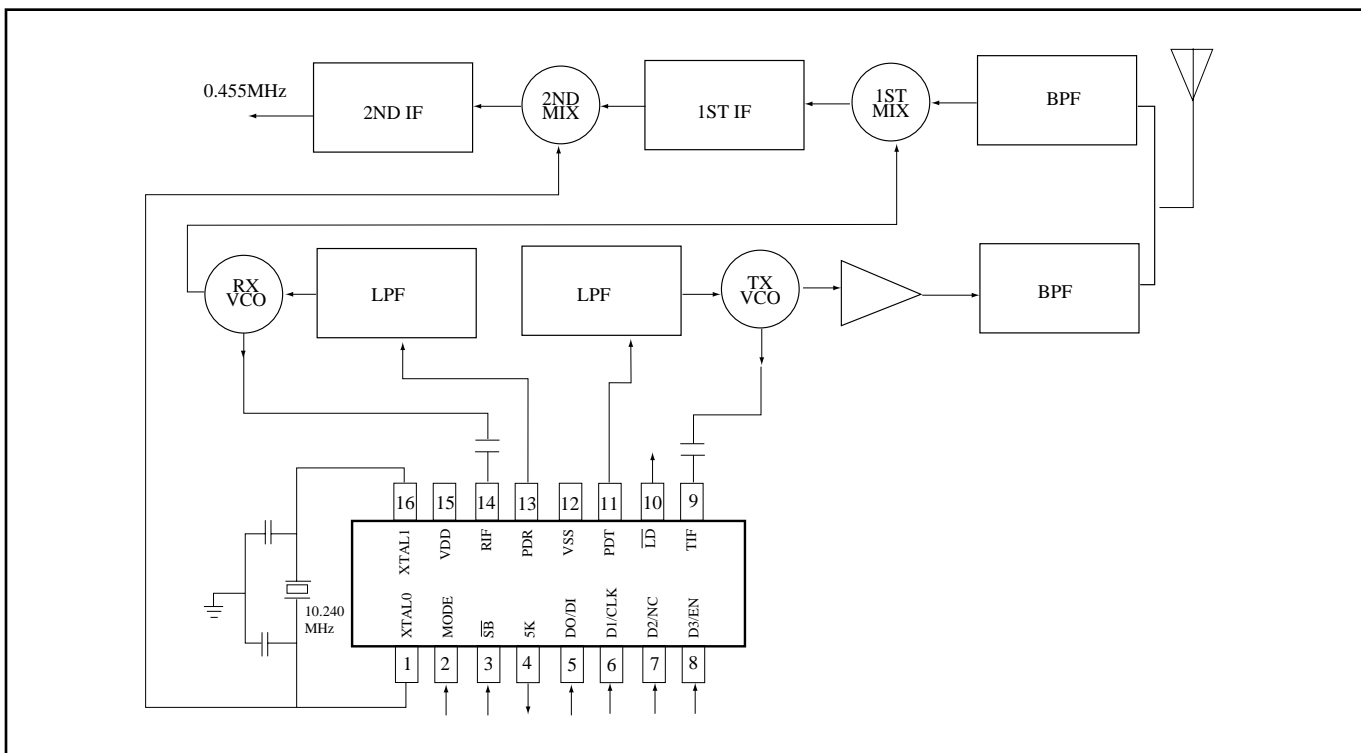


EM92601A Timing



Unlock Timing

APPLICATION CIRCUIT



DIVIDE RATIO AND VCO FREQUENCIES

| Base (MODE=1) | Input | | | | CH | Rx (Fref=5KHz) | | | Tx=(Fref=5KHz) | | |
|------------------|-------|----|----|----|----|----------------|-----------|------|----------------|-----------|------|
| | D3 | D2 | D1 | D0 | | FRx (MHz) | FVCO(MHz) | N | FTx(MHz) | FVCO(MHz) | N |
| | 0 | 0 | 0 | 1 | 1 | 49.670 | 38.975 | 7795 | 46.610 | 46.610 | 9322 |
| | 0 | 0 | 1 | 0 | 2 | 49.845 | 39.150 | 7830 | 46.630 | 46.630 | 9326 |
| | 0 | 0 | 1 | 1 | 3 | 49.860 | 39.165 | 7833 | 46.670 | 46.670 | 9334 |
| | 0 | 1 | 0 | 0 | 4 | 49.770 | 39.075 | 7815 | 46.710 | 46.710 | 9342 |
| | 0 | 1 | 0 | 1 | 5 | 49.875 | 39.180 | 7836 | 46.730 | 46.730 | 9346 |
| | 0 | 1 | 1 | 0 | 6 | 49.830 | 39.135 | 7827 | 46.770 | 46.770 | 9354 |
| | 0 | 1 | 1 | 1 | 7 | 49.890 | 39.195 | 7839 | 46.830 | 46.830 | 9366 |
| | 1 | 0 | 0 | 0 | 8 | 49.930 | 39.235 | 7847 | 46.870 | 46.870 | 9374 |
| | 1 | 0 | 0 | 1 | 9 | 49.990 | 39.295 | 7859 | 46.930 | 46.930 | 9386 |
| | 1 | 0 | 1 | 0 | 10 | 49.770 | 39.275 | 7855 | 46.970 | 46.970 | 9394 |
| | 1 | 0 | 1 | 1 | | 49.970 | 39.275 | 7855 | 46.970 | 46.970 | 9394 |
| | 1 | 1 | 0 | 0 | | 49.970 | 39.275 | 7855 | 46.970 | 46.970 | 9394 |
| | 1 | 1 | 0 | 1 | | 49.970 | 39.275 | 7855 | 46.970 | 46.970 | 9394 |
| | 1 | 1 | 1 | 0 | | 49.970 | 39.275 | 7855 | 46.970 | 46.970 | 9394 |
| | 1 | 1 | 1 | 1 | | 49.970 | 39.275 | 7855 | 46.970 | 46.970 | 9394 |
| | 0 | 0 | 0 | 0 | | 49.970 | 39.275 | 7855 | 46.970 | 46.970 | 9394 |
| | 0 | 0 | 0 | 0 | | 49.970 | 39.275 | 7855 | 46.970 | 46.970 | 9394 |

| REMOTE (MODE=0) | Input | | | | CH | Rx (Fref=5KHz) | | | Tx=(Fref=5KHz) | | |
|--------------------|-------|----|----|----|----|----------------|-----------|------|----------------|-----------|------|
| | D3 | D2 | D1 | D0 | | FRx (MHz) | FVCO(MHz) | N | FTx(MHz) | FVCO(MHz) | N |
| | 0 | 0 | 0 | 1 | 1 | 46.610 | 35.915 | 7183 | 49.670 | 49.670 | 9934 |
| | 0 | 0 | 1 | 0 | 2 | 46.630 | 35.935 | 7187 | 49.845 | 49.845 | 9969 |
| | 0 | 0 | 1 | 1 | 3 | 46.670 | 35.975 | 7195 | 49.860 | 49.860 | 9972 |
| | 0 | 1 | 0 | 0 | 4 | 46.710 | 36.015 | 7203 | 49.770 | 49.770 | 9954 |
| | 0 | 1 | 0 | 1 | 5 | 46.730 | 36.035 | 7207 | 49.875 | 49.875 | 9975 |
| | 0 | 1 | 1 | 0 | 6 | 46.770 | 36.075 | 7215 | 49.830 | 49.830 | 9966 |
| | 0 | 1 | 1 | 1 | 7 | 46.830 | 36.135 | 7227 | 49.890 | 49.890 | 9978 |
| | 1 | 0 | 0 | 0 | 8 | 46.870 | 36.175 | 7235 | 49.930 | 49.930 | 9986 |
| | 1 | 0 | 0 | 1 | 9 | 46.930 | 36.235 | 7247 | 49.990 | 49.990 | 9998 |
| | 1 | 0 | 1 | 0 | 10 | 46.970 | 36.275 | 7255 | 49.970 | 49.970 | 9994 |
| | 1 | 0 | 1 | 1 | | 46.970 | 36.275 | 7255 | 49.970 | 49.970 | 9994 |
| | 1 | 1 | 0 | 0 | | 46.970 | 36.275 | 7255 | 49.970 | 49.970 | 9994 |
| | 1 | 1 | 0 | 1 | | 46.970 | 36.275 | 7255 | 49.970 | 49.970 | 9994 |
| | 1 | 1 | 1 | 0 | | 46.970 | 36.275 | 7255 | 49.970 | 49.970 | 9994 |
| | 1 | 1 | 1 | 1 | | 46.970 | 36.275 | 7255 | 49.970 | 49.970 | 9994 |
| | 0 | 0 | 0 | 0 | | 46.970 | 36.275 | 7255 | 49.970 | 49.970 | 9994 |
| | 0 | 0 | 0 | 0 | | 46.970 | 36.275 | 7255 | 49.970 | 49.970 | 9994 |