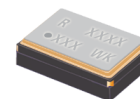


IT2200B



SMD Temperature Compensated Crystal Oscillator

Low cost SMD TCXO using an analogue IC for compensation. Frequency range from 10MHz to 45MHz.



Product description

The IT2200B with optional voltage control feature, employs an analogue IC for the oscillator and temperature compensation. 2.5mm x 2.0mm in size. The RSX-10 crystal is surface mounted on top of the ceramic IC carrier. The segregation of the crystal from the oscillator further improves the reliability of the product.

Applications

- Handset
- GPS
- PDA
- PCMCIA CDPD cards
- LBS Handset
- Consumer Products
- PND
- WiFi
- WiMAX/WLAN
- Communications
- Other

Features

- Excellent phase noise performance
- Frequency slope and perturbation specifications can be customized to the application requirement
- Standard temperature stability choices are $\pm 0.5\text{ppm}$, $\pm 1\text{ppm}$, $\pm 1.5\text{ppm}$ and $\pm 2.5\text{ppm}$ over wide temperature ranges

Specifications

1.0 SPECIFICATION REFERENCES

| Line | Parameter | Description |
|------|-------------------|--------------------|
| 1.1 | Model description | IT2200B / IVT2200B |
| 1.2 | RoHS Compliant | Yes |
| 1.3 | Holder style | Type 2 |

2.0 FREQUENCY CHARACTERISTICS

| Line | Parameter | Test Condition | Value | Unit |
|------|--------------------------------------|--|----------------|-------------------------|
| 2.1 | Frequency range | Frequency range available | 10 to 45 | MHz |
| 2.2 | Frequency calibration | Offset from nominal frequency measured at $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ | ± 1 max | ppm |
| 2.3 | Reflow shift | Two consecutive reflows as per attached profile after 1 hour recovery | ± 1 max | ppm |
| 2.4 | Frequency stability over temperature | Referenced to the midpoint between minimum and maximum frequency value over the specified temperature range (Note 1, 2) | ± 0.5 to 5 | ppm |
| 2.5 | Temperature range | The operating temperature range over which the frequency stability is measured (Note 3) | -30 to 85 | $^{\circ}\text{C}$ |
| 2.6 | Frequency slope | Minimum of 1 frequency reading every 2°C , over the operating temperature range (Note 1, 4) | 0.05 to 1 | ppm/ $^{\circ}\text{C}$ |
| 2.7 | Static temperature hysteresis | Frequency change after reciprocal temperature ramped over the operating range. Frequency measured before and after at 25°C | 0.6 max | ppm |
| 2.8 | Supply voltage stability | Supply voltage varied $\pm 5\%$ at 25°C (Note 4) | ± 0.2 max | ppm |
| 2.9 | Load sensitivity | $\pm 5\%$ load change | ± 0.2 max | ppm |
| 2.10 | Long term stability | Frequency drift over 1 year (Note 4) | ± 2 max | ppm |

3.0 POWER SUPPLY

| Line | Parameter | Test Condition | Value | Unit |
|------|----------------|---------------------------------------|------------|------|
| 3.1 | Supply voltage | Nominal supply voltage range (Note 5) | 2.3 to 3.7 | V |
| 3.2 | Current | At maximum supply voltage (Note 6) | 2 max | mA |

4.0 CONTROL VOLTAGE (VCO) OPTION

| Line | Parameter | Test Condition | Value | Unit |
|------|-----------------------|--|------------|------|
| 4.1 | Control voltage range | The nominal control voltage value is midway between the minimum and maximum (Note 7) | 0.5 to 2.8 | V |
| 4.2 | Frequency tuning | Frequency shift from minimum to maximum control voltages (Note 8) | 6 to 50 | ppm |
| 4.3 | Port input impedance | Measured between Control voltage and GND pin | 500 min | kOhm |

5.0 OSCILLATOR OUTPUT

| Line | Parameter | Test Condition | Value | Unit |
|------|-------------------------|--------------------------------------|-------------|------|
| 5.1 | Output waveform | DC coupled clipped sinewave (Note 9) | | |
| 5.2 | Output voltage | At minimum supply voltage (Note 6) | 0.8 min | V |
| 5.3 | Output load resistance | Refer to test circuit | 9.5 to 10.5 | kOhm |
| 5.4 | Output load capacitance | Refer to test circuit | 9.5 to 10.5 | pF |

6.0 SSB PHASE NOISE

| Line | Parameter | Test Condition | Value | Unit |
|------|--|---|----------|--------|
| 6.1 | SSB phase noise power density at 1Hz offset | Typical values for a 26.0MHz oscillator at 25°C | -62 max | dBc/Hz |
| 6.2 | SSB phase noise power density at 10Hz offset | Typical values for a 26.0MHz oscillator at 25°C | -90 max | dBc/Hz |
| 6.3 | SSB phase noise power density at 100Hz offset | Typical values for a 26.0MHz oscillator at 25°C | -114 max | dBc/Hz |
| 6.4 | SSB phase noise power density at 1KHz offset | Typical values for a 26.0MHz oscillator at 25°C | -133 max | dBc/Hz |
| 6.5 | SSB phase noise power density at 10KHz offset | Typical values for a 26.0MHz oscillator at 25°C | -146 max | dBc/Hz |
| 6.6 | SSB phase noise power density at 100KHz offset | Typical values for a 26.0MHz oscillator at 25°C | -148 max | dBc/Hz |

7.0 ENVIROMENTAL

| Line | Parameter | Description |
|------|---------------------|---|
| 7.1 | Shock | Half sinewave acceleration of 100G peak amplitude for 6ms duration, 3 cycles each plain |
| 7.2 | Humidity | After 48 hours at 85°C \pm 2°C 85% relative humidity non-condensing |
| 7.3 | Thermal shock | Exposed at -40°C for 30 minutes then to 85°C for 30 minutes repeatedly for a period of 5 days |
| 7.4 | Vibration | 10G RMS from 30Hz to 1500Hz random in each of the 3 axis for 4 hours; total of 12 hours |
| 7.5 | Storage temperature | -40 to 85°C |

8.0 MARKING

| Line | Parameter | Description |
|------|-----------|---------------------|
| 8.1 | Type | Engraved |
| 8.2 | Line 1 | R and Product code |
| 8.3 | Line 2 | Pin 1 and Date code |

9.0 MANUFACTURING INFORMATION

| Line | Parameter | Description |
|------|-----------------------|---|
| 9.1 | Reflow | Solder reflow process as per attached profile |
| 9.2 | Packaging description | Tape and reel. Standard packing quantity is 3000 units per reel |

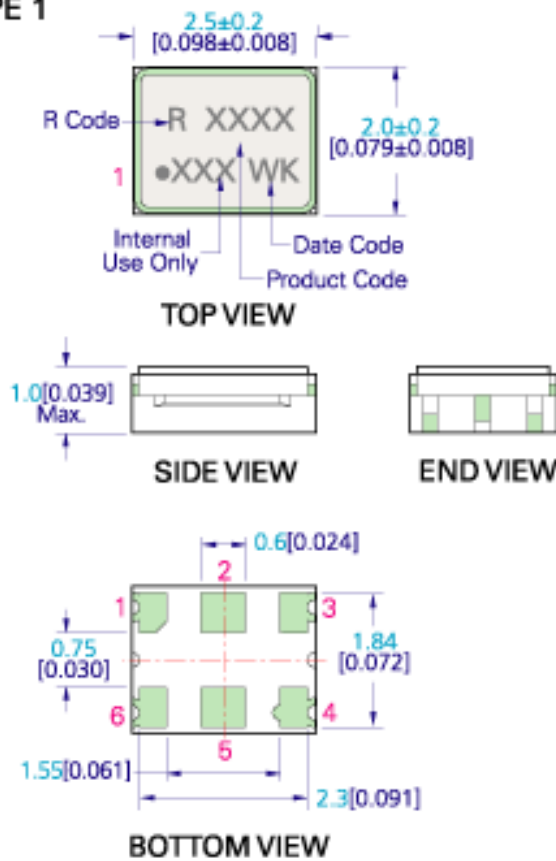
10.0 SPECIFICATION NOTES

| Line | Parameter | Description |
|------|-----------|--|
| 10.1 | Note 1 | A maximum frequency stability over the temperature is required to be specified. Standard options are $\pm 0.5\text{ppm}$, $\pm 1.0\text{ppm}$, and $\pm 2.5\text{ppm}$ |
| 10.2 | Note 2 | Part should be shielded from drafts causing unexpected thermal gradients. Temperature changes due to ambient air currents on the oscillator can lead to short term frequency drift |
| 10.3 | Note 3 | The operating temperature range needs to be specified. The extremes for this model are -40 to 85°C |
| 10.4 | Note 4 | The maximum value is the specification. A minimum value, if present, indicates the best specification available |
| 10.5 | Note 5 | The unit will operate on any voltage between minimum and maximum values |
| 10.6 | Note 6 | Specified for load stated in 4.3 and 4.4 at 25°C |
| 10.7 | Note 7 | Voltage control can not exceed $V_{cc}-0.2\text{V}$ or below $\text{GND} + 0.2\text{V}$ |
| 10.8 | Note 8 | The maximum frequency tuning range depends on the design frequency and the trimming sensitivity of the crystal. Linearity performance degrades if maximum frequency tuning setting is selected |
| 10.9 | Note 9 | External AC-Coupling capacitor required. 1nF or greater recommended |

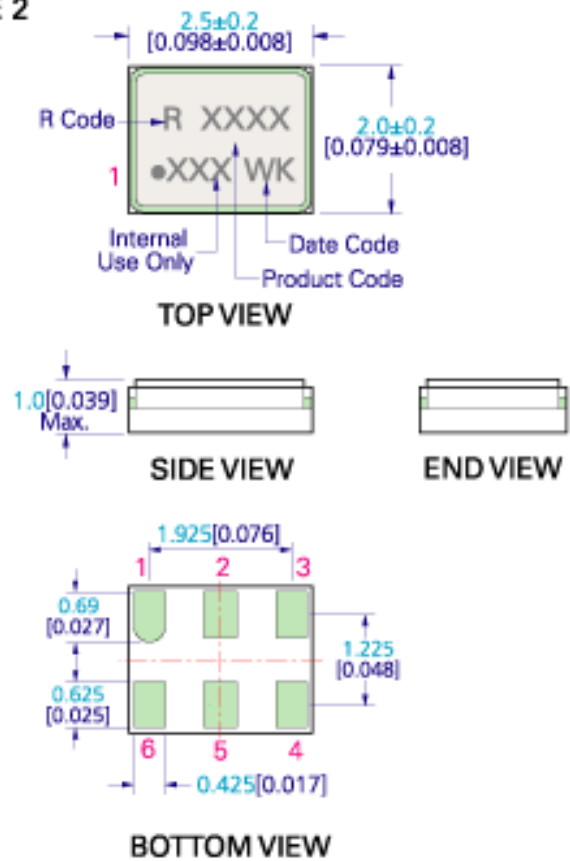
Drawing Name: I(V)T2200B Model Drawing

MODEL DRAWING

TYPE 1



TYPE 2

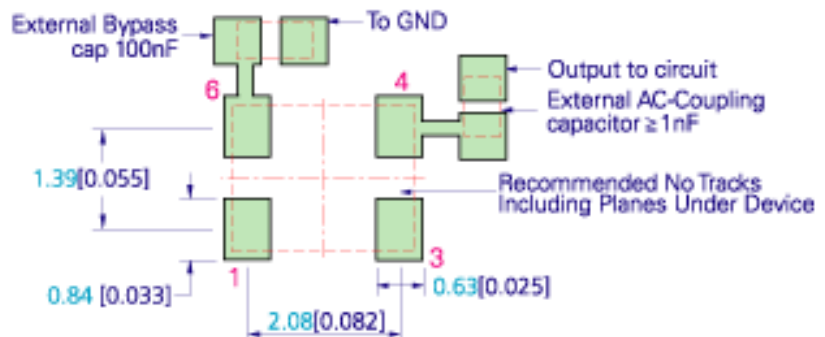


PIN CONNECTIONS

| Pin | IT | IVT |
|-----|--------|--------|
| 1 | NC | VCO |
| 2 | NC | NC |
| 3 | GND | GND |
| 4 | OUTPUT | OUTPUT |
| 5 | NC | NC |
| 6 | VCC | VCC |

NOTE:
Bottom view and height variations cater for alternative ceramic suppliers.
Recommended Pad Layout supports both.

RECOMMENDED PAD LAYOUT - TOP VIEW



TITLE: I(V)T2200B MODEL

RELATED DRAWINGS:

FILENAME: CAT419

REVISION: D

DATE: 19-Jan-09

SCALE: 10 : 1

Millimetres [inch]

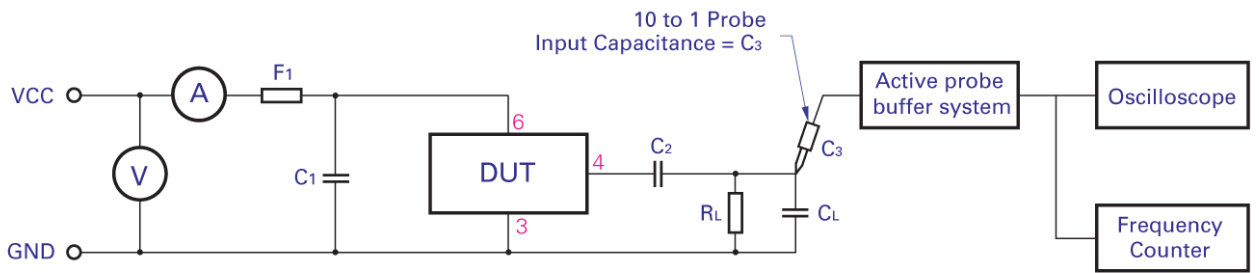
Tolerance:
XX = ±0.5
X.X = ±0.2
X.XX = ±0.10
X.XXX = ±0.05
X⁰ = ±1.0°
Hole = ±0.10

rakon

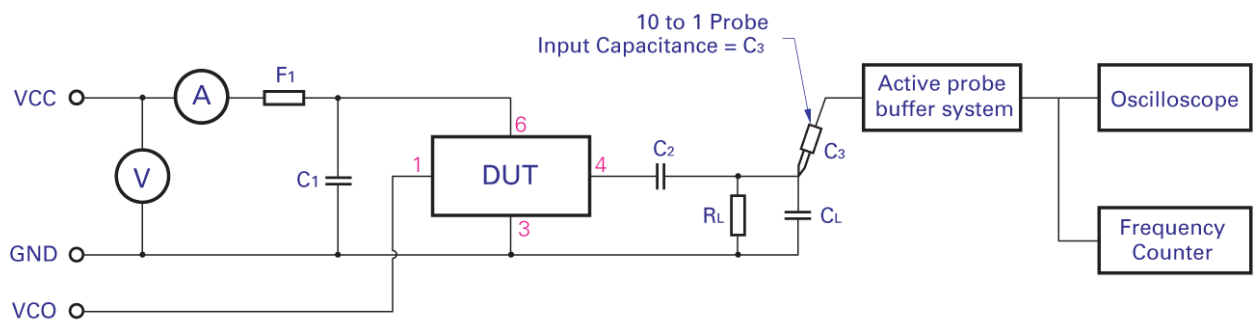
©2009 Rakon Limited

Drawing Name: I(V)T2200 Series Test Circuit

IT TEST CIRCUIT :



IVT TEST CIRCUIT :



C_1 : 100nF

C_2 : ≥ 1 nF

R_L : 10K

$C_T = C_L + C_3$ (C_3 - Oscilloscope probe capacitance)

C_T as stated in OSCILLATOR OUTPUT section

F_1 : A ferrite bead or a resistor between $22\Omega \sim 47\Omega$ recommended.

TITLE: I(V)T2200 SERIES TEST CIRCUIT

FILENAME: CAT421

RELATED DRAWINGS:

REVISION: D

DATE: 16-Apr-09

SCALE: NTS

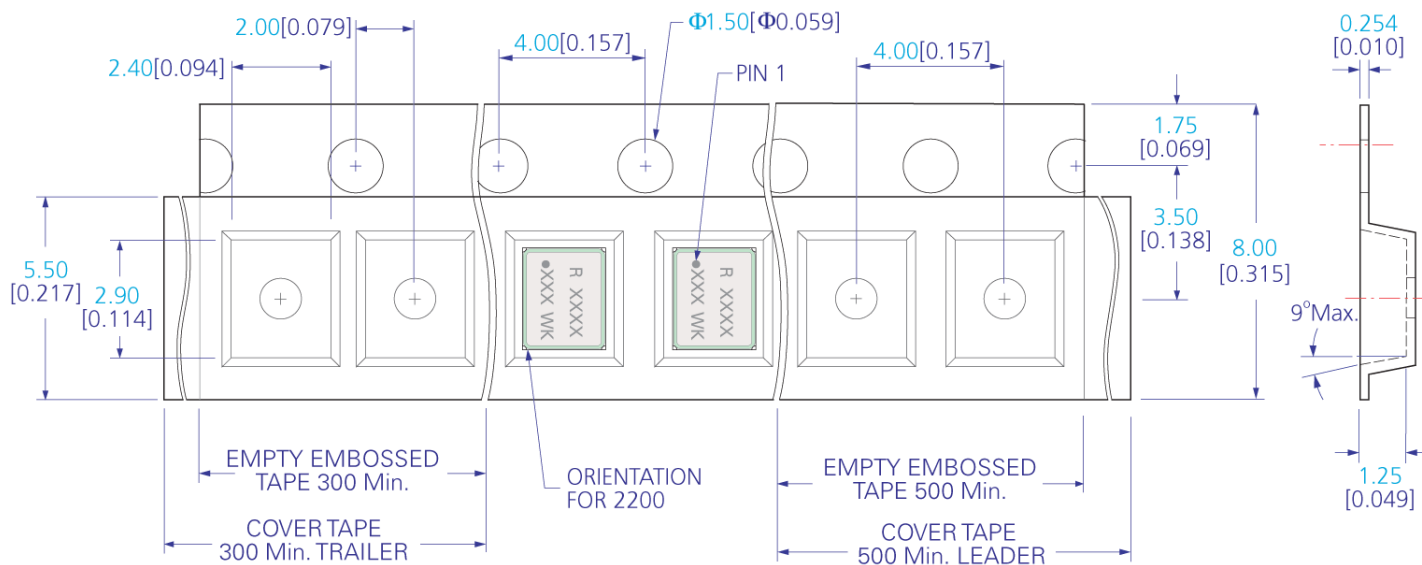
Millimetres [inch]

rakon

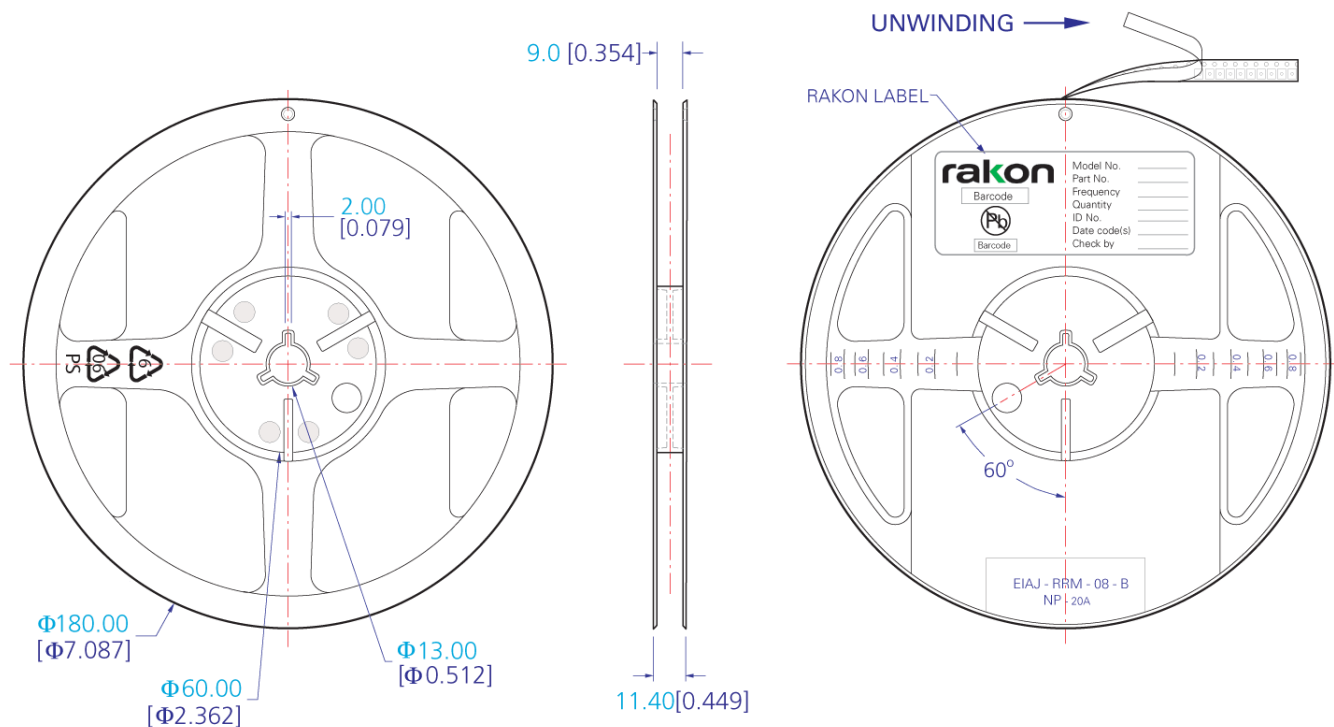
©2009 Rakon Limited

Drawing Name: 2200 Series Tape & Reel

TAPE DETAIL (SCALE 5 : 1)



REEL DETAIL (SCALE 1 : 2.5)



TITLE: 2200 SERIES TAPE & REEL

RELATED DRAWINGS:

FILENAME: CAT422

REVISION: C

DATE: 24-May-10

SCALE: See above

Millimetres [inch]

Tolerance:

XX = ± 0.5

X.X = ± 0.2

X.XX = ± 0.10

X.XXX = ± 0.05

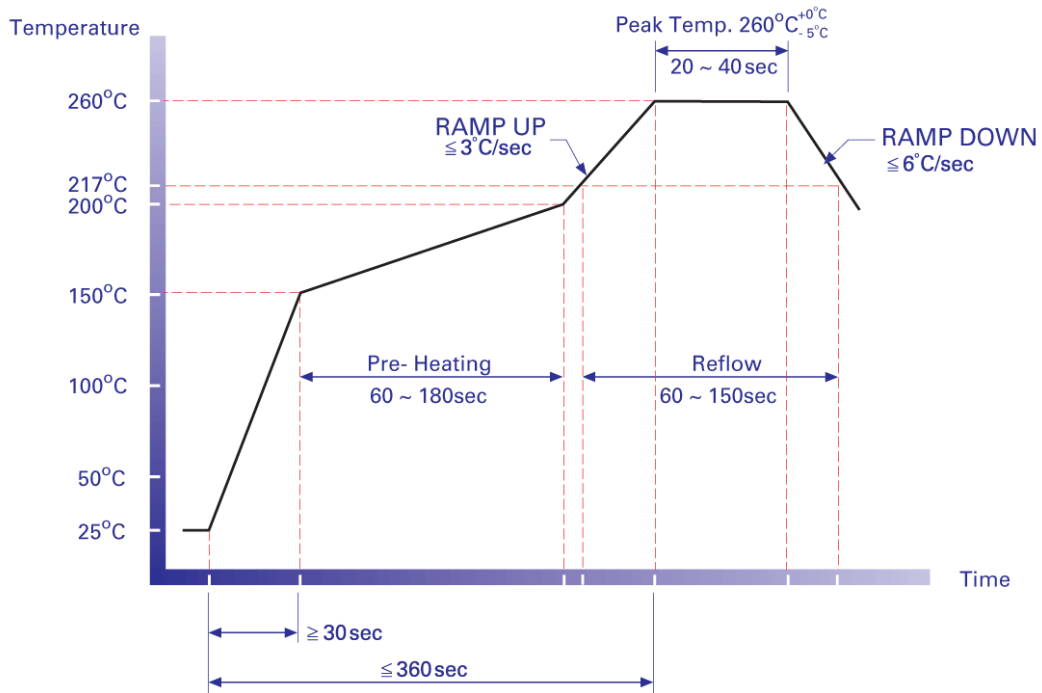
X° = $\pm 1.0^\circ$

Hole = ± 0.10

rakon

©2009 Rakon Limited

Drawing Name: Pb-Free Reflow



NOTE:

The product has been tested to withstand the Reflow Profile shown. The Reflow Profile used to solder Rakon products is determined by the solder paste manufacturer's specification. It is recommended that the Reflow Profile used does not exceed the one shown above.

TITLE: Pb-FREE REFLOW

RELATED DRAWINGS:

FILENAME: CAT541

REVISION: B

DATE: 07-Apr-10

SCALE: NTS

Millimetres [inch]



©2009 Rakon Limited

Specification History

Current Version : 1.01

| Version | User | Change | Note |
|---------|------|--------|------|
|---------|------|--------|------|