Dielectric Resonator Oscillators
2 - 20 GHz

MLO 10000 Series

V3.00

Features

- High Frequency Stability
- Low Phase Noise
- High Output Power
- Electronic Tuning
- Switched Output

Description

M/A-COM's MLO 10000 series of dielectric resonator oscillators (DROs) provides a range of microwave signal sources which offer excellent frequency accuracy and temperature stability coupled with low phase noise, low power consumption and high reliability. The range includes fixed tuned DROs available with higher output power or switched output and an electronically tuned series with varactor tuning sufficient to provide full temperature compensation. Mechanical tuning is also available as an option.

All M/A-COM DROs are fundamental oscillators using thin film hybrid construction. The discrete bipolar or FET devices, passive devices, dielectric resonator and regulator are assembled in modular form prior to assembly into the coaxial housing which is then hermetically sealed. This compact, rugged construction makes these oscillators suitable for the environmental conditions encountered in both military and commercial applications.

DROs have many applications in microwave systems such as EW receivers, airborne radar, built in test equipment (BITE), transponders and communications. They can be used as fixed frequency local oscillators for up and down converters in microwave front ends, transmitter oscillators for commercial interrogation systems and, when electronically tuned, in phase locked loop systems.

In addition to the range of DROs described, M/A-COM also manufactures devices which have other component functions integrated within the same housing. Available options include higher output powers, coupled outputs, integral PIN diode attenuators for output power variation and selectable frequency sources of two or more DROs with a common switched output. For details of these options and to discuss other custom requirements please contact the factory for applications assistance.

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DESCRIPTION

This series of DROs uses high Q dielectric resonators to produce highly stable low noise oscillators operating over the full military temperature range. All devices have an integral voltage regulator providing a stable output frequency for a wide variation of power supply voltage.

SPECIFICATIONS

Frequency Range (GHz)	Freq. Accuracy (all causes) (%) Max.	Freq. Stability (ppm/°C) Max.	Output Power (dBm) Min.	Output Power Var (dB) Max.	Phase Noise (dBc/Hz) @10KHz Max.	Phase Noise (dBc/Hz) @100KHz Max.	Current Consump. at +15V (mA) Max.	Package Style	Part Number
2.000 - 3.999	±0.050	4	+10	±1.0	-100	-125	75	DA1	MLO 11200
4.000 - 5.999	±0.050	4	+10	±1.0	-100	-125	75	DB1	MLO 11300
6.000 - 7.999	±0.050	4	+10	±1.0	-100	-120	75	DC1	MLO 11400
8.000 - 11.999	±0.050	4	+10	±1.0	-90	-110	75	DD1	MLO 11500
12.000 - 17.999	±0.050	4	+10	±1.0	-80	-100	75	DE1	MLO 11600
18.000 - 20.000	±0.075	6	+10	±1.0	-70	-90	75	DE1	MLO 11700

NOTES

1) The frequency accuracy specification includes the variation of frequency with temperature, load VSWR, power supply voltage, ageing and the setting accuracy.
2) Frequency pulling ±0.02% maximum into a load VSWR 1.5:1 all phases
3) Frequency pushing 100 KHz maximum for supply voltage variation +12 to +18V
4) Harmonic Outputs -20dBc maximum
5) Spurious Outputs -60dBc maximum
6) Operating temperature range -55°C to +85°C
   Storage temperature range -55°C to +100°C
7) All standard devices have a fixed output frequency, however, mechanical tuning is also available as an option. Minimum tuning bandwidths ranges from ±5 MHz at 2 GHz to ±50 MHz at 20 GHz. Please contact the factory for further details.
8) Turn on time is 20us from application of dc voltage to within 10 MHz of final frequency.
9) All devices are supplied with a removable SMA female connector as standard, an SMA male connector can be specified as an option, please contact the factory.
10) When ordering please specify the exact output frequency required in MHz as a 5 digit suffix to the part number. e.g. for a frequency of 9825 MHz the part number would be MLO 11500-09825.

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DESCRIPTION

This series of DROs combines the high Q oscillator circuit with an integral buffer amplifier stage to provide higher output power. The buffer amplifier also reduces oscillator to load coupling to give minimum frequency pulling due to variations in load VSWR.

SPECIFICATIONS

Frequency Range (GHz)	Freq. Accuracy (all causes) (%) Max.	Freq. Stability (ppm/°C) Max.	Output Power (dBm) Min.	Output Power Var (dB) Max.	Phase Noise (dBc/Hz) @10KHz Max.	Phase Noise (dBc/Hz) @100KHz Max.	Current Consump. at +15V (mA) Max.	Package Style	Part Number
2.000 - 3.999	±0.070	8	+20	±1.5	-100	-125	250	DA2	MLO 12200
4.000 - 5.999	±0.070	8	+20	±1.5	-100	-125	250	DB2	MLO 12300
6.000 - 7.999	±0.070	8	+20	±1.5	-100	-120	250	DC2	MLO 12400
8.000 - 11.999	±0.070	8	+20	±1.5	-90	-110	300	DD2	MLO 12500
12.000 - 17.999	±0.070	8	+20	±1.5	-80	-100	300	DE2	MLO 12600
18.000 - 20.000	±0.100	12	+20	±1.5	-70	-90	350	DE2	MLO 12700

NOTES

1) The frequency accuracy specification includes the variation of frequency with temperature, load VSWR, power supply voltage, ageing and the setting accuracy.
2) Frequency pulling ±0.01% maximum into a load VSWR 1.5:1 all phases
3) Frequency pushing 100 KHz maximum for supply voltage variation +12 to +18V
4) Harmonic Outputs -15dBc maximum
5) Spurious Outputs -60dBc maximum
6) Operating temperature range -55°C to +85°C
   Storage temperature range -55°C to +100°C
7) All standard devices have a fixed output frequency, however, mechanical tuning is also available as an option. Minimum tuning bandwidths ranges from ±5 MHz at 2 GHz to ±50 MHz at 20 GHz. Please contact the factory for further details.
8) Turn on time is 20us from application of dc voltage to within 10 MHz of final frequency.
9) All devices are supplied with a removable SMA female connector as standard, an SMA male connector can be specified as an option, please contact the factory.
10) When ordering please specify the exact output frequency required in MHz as a 5 digit suffix to the part number. e.g. for a frequency of 9825 MHz the part number would be MLO 12500-09825.

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DESCRIPTION

Switched output DROs have an integral PIN diode switch and TTL driver to provide high isolation with fast rise and fall times. These DROs can be used to provide transmitter oscillators capable of high modulation rates or as BITE sources capable of producing fast rise time pulses for EW simulations.

SPECIFICATIONS

Frequency Range (GHz)	Freq. Accuracy (all causes) (%) Max.	Freq. Stability (ppm/°C) Max.	Output Power (dBm) Min.	Output Power Var (dB) Max.	Phase Noise (dBc/Hz) @10KHz Max.	Phase Noise (dBc/Hz) @100KHz Max.	Switched Isolation (dB) Min.	Package Style	Part Number
2.000 - 3.999	±0.050	4	+10	±1.0	-100	-125	50	DA2	MLO 13200
4.000 - 5.999	±0.050	4	+10	±1.0	-100	-125	50	DB2	MLO 13300
6.000 - 7.999	±0.050	4	+10	±1.0	-100	-120	50	DC2	MLO 13400
8.000 - 11.999	±0.050	4	+10	±1.0	-90	-110	50	DD2	MLO 13500
12.000 - 17.999	±0.050	4	+10	±1.0	-80	-100	40	DE2	MLO 13600
18.000 - 20.000	±0.075	6	+10	±1.0	-70	-90	40	DE2	MLO 13700

NOTES

1) The frequency accuracy specification includes the variation of frequency with temperature, load VSWR, power supply voltage, ageing and the setting accuracy.
2) Frequency pulling ±0.02% maximum into a load VSWR 1.5:1 all phases
3) Frequency pushing 100 KHz maximum for supply voltage variation +12 to +18V
4) Harmonic Outputs -20dBc maximum
5) Spurious Outputs -60dBc maximum
6) Transition Time 5ns maximum 10% to 90% detected RF output power
   Switching Speed 20ns maximum 50% TTL input to 90% detected RF output power
7) Power Supplies +15V @ 130mA maximum
   -15V @ 10mA maximum
8) Control Input TTL '0' RF output on, TTL '1' RF output off
9) Operating temperature range -55°C to +85°C
   Storage temperature range -55°C to +100°C
10) All standard devices have a fixed output frequency, however, mechanical tuning is also available as an option. Minimum tuning bandwidths ranges from ±5 MHz at 2 GHz to ±50 MHz at 20 GHz. Please contact the factory for further details.
11) Turn on time is 20us from Application of dc voltage to within 10 MHz of final frequency.
12) All devices are supplied with a removable SMA female connector as standard, an SMA male connector can be specified as an option, please contact the factory.
13) When ordering please specify the exact output frequency required in MHz as a 5 digit suffix to the part number. e.g. for a frequency of 9825 MHz the part number would be MLO 13500-09825.

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DESCRIPTION

M/A-COM Ltd electronically tuned DROs have a combination of high Q dielectric resonator circuit and varactor diode providing a tuning bandwidth sufficient to compensate for the variation of output frequency over the full military temperature range. These devices can be used with an external reference to provide phase locked oscillator performance.

SPECIFICATIONS

Frequency Range (GHz)	Output Power (dBm) Min.	Output Power Variation (dB) Max.	Phase Noise (dBc/Hz) @10KHz Max.	Phase Noise (dBc/Hz) @100KHz Max.	Current Consumption at +15V (mA) Max.	Package Style	Part Number
2.000 - 3.999	+7	±2.0	-95	-115	75	DA1	MLO 14200
4.000 - 5.999	+7	±2.0	-95	-115	75	DB1	MLO 14300
6.000 - 7.999	+7	±2.0	-95	-115	75	DC1	MLO 14400
8.000 - 11.999	+7	±2.0	-85	-100	75	DD1	MLO 14500
12.000 - 17.999	+7	±2.0	-75	-90	75	DE1	MLO 14600
18.000 - 20.000	+7	±2.0	-65	-80	75	DE1	MLO 14700

NOTES

1) The electronic tuning bandwidth for each device is sufficient to compensate for the frequency drift across the full operating temperature range.
2) Frequency pulling ±0.02% maximum into a load VSWR 1.5:1 all phases
3) Frequency pushing 100 KHz maximum for supply voltage variation +12 to +18V
4) Harmonic Outputs -20dBc maximum
5) Spurious Outputs -60dBc maximum
6) Tuning voltage input (VT) in the range +2 to +20V.
7) Operating temperature range -55°C to +85°C
   Storage temperature range -55°C to +100°C
8) Turn on time is 20us from application of dc voltage to within 10 MHz of final frequency.
9) All devices are supplied with a removable SMA female connector as standard, an SMA male connector can be specified as an option, please contact the factory.
10) When ordering please specify the exact output frequency required in MHz as a 5 digit suffix to the part number. e.g. for a frequency of 9825 MHz the part number would be MLO 14500-09825.

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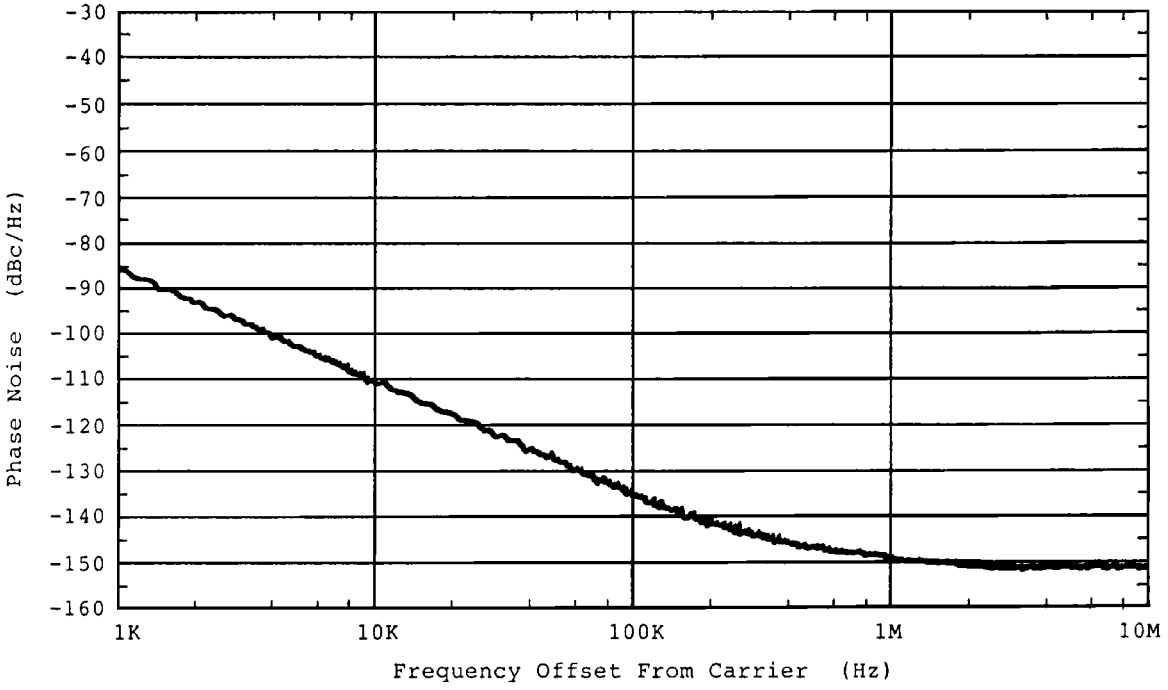
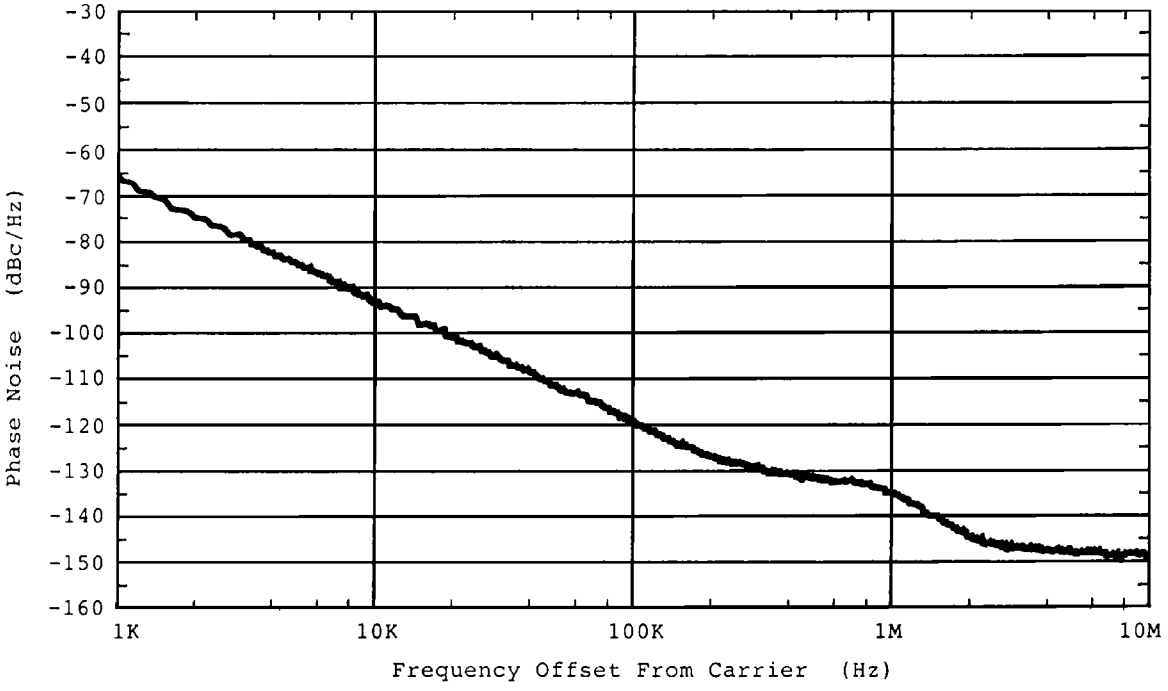
TYPICAL PERFORMANCE

Single Side Band Phase Noise at 2.45 GHz
MLO 11200-02450



Single Side Band Phase Noise at 8.20 GHz
MLO 11500-08200



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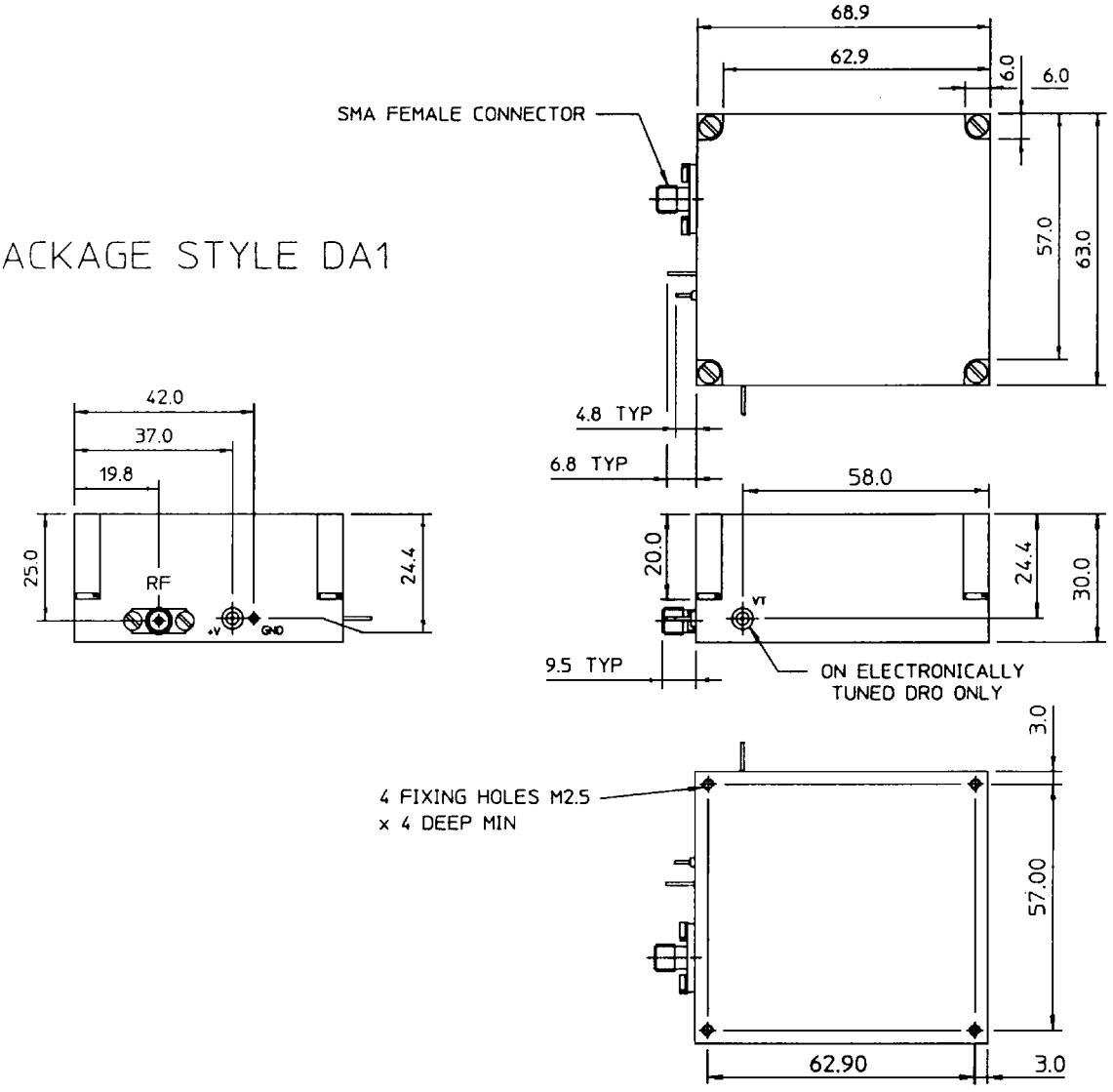
OUTLINE DRAWINGS

High Stability (MLO 11000) and Electronically Tuned (MLO 14000) DRO's

PACKAGE STYLE DA1



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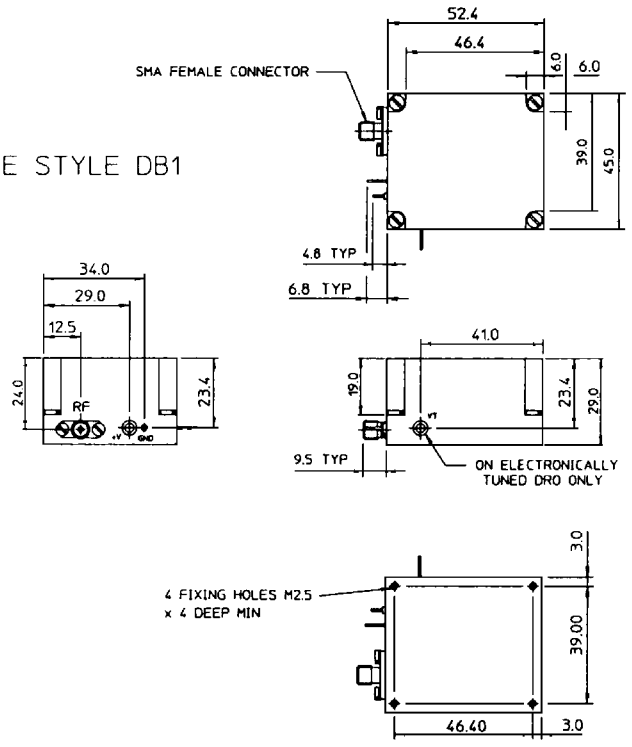

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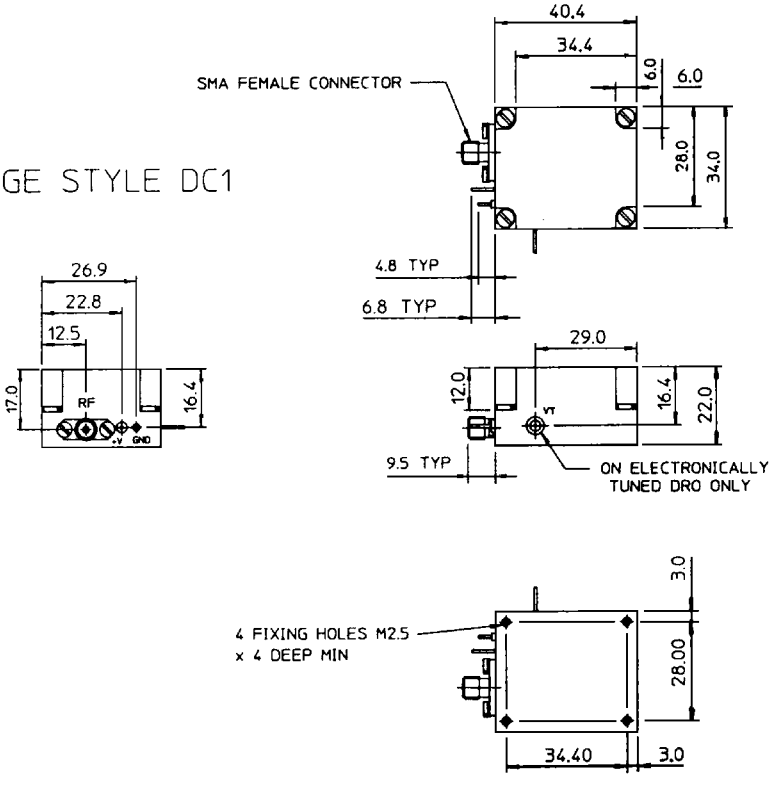

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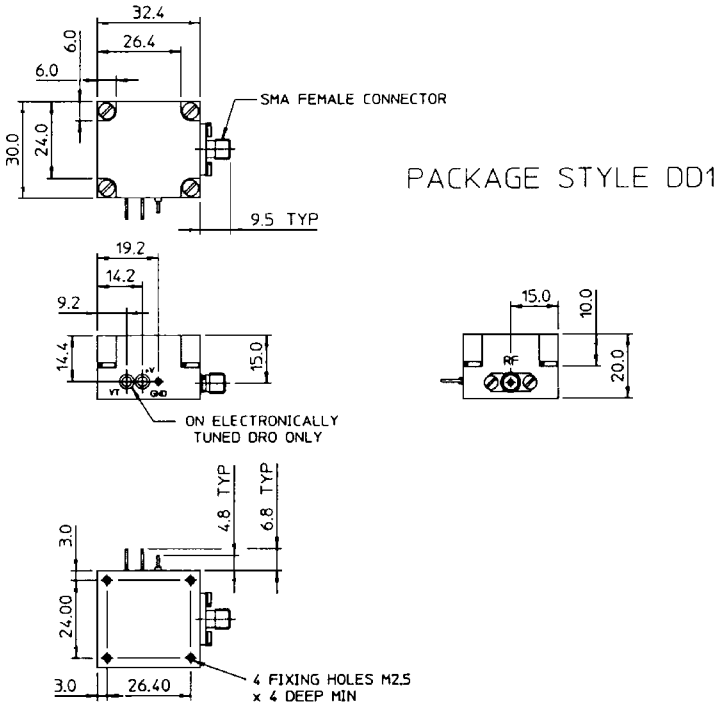
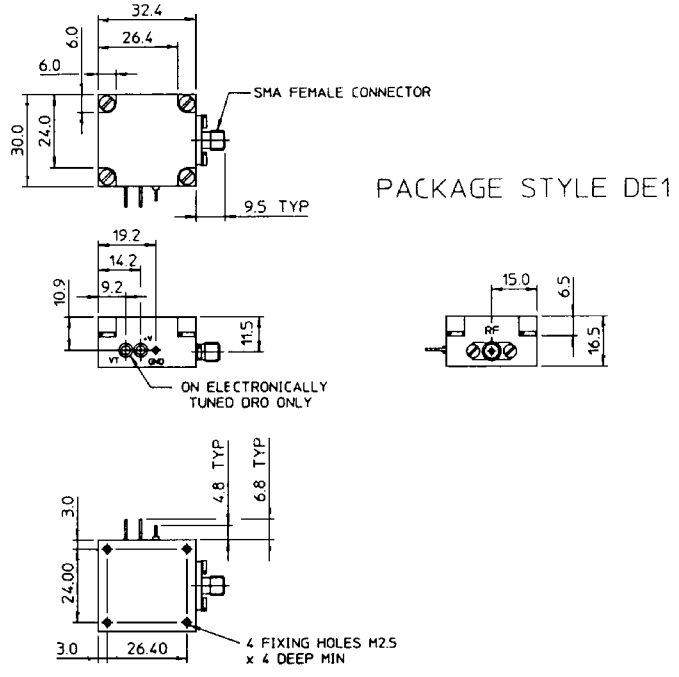




DRAWING NOTES

Third Angle Projection

All dimensions in mm

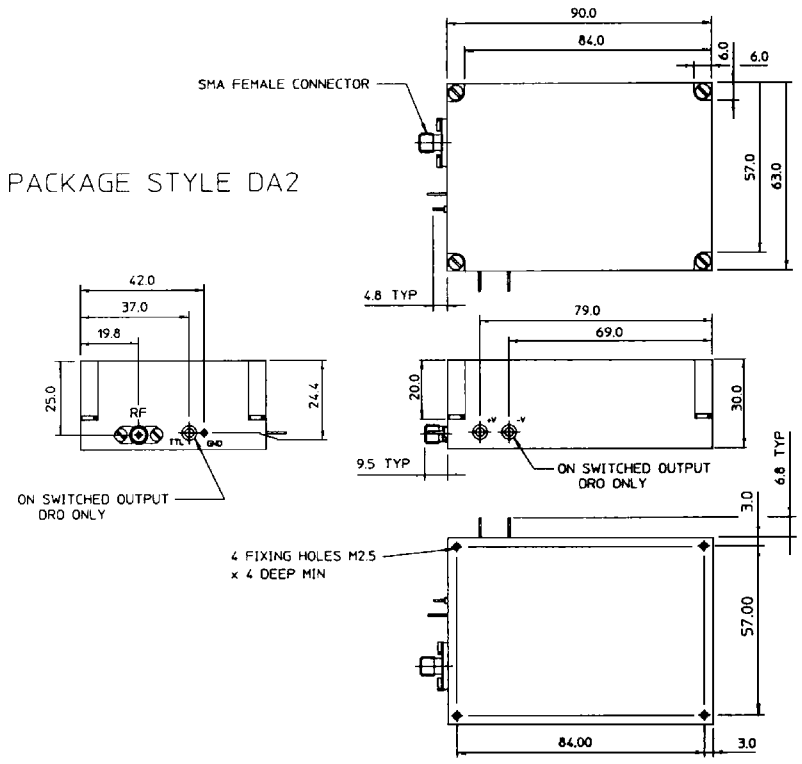
Tolerances x.x = ±0.5mm
x.xx = ±0.2mm

Standard Finish: Matt black paint to DTD 5555A

VT Solder Pin on Electronically Tuned DRO's only

OUTLINE DRAWINGS

High Power (MLO 12000) and Switched Output (MLO 13000) DRO's



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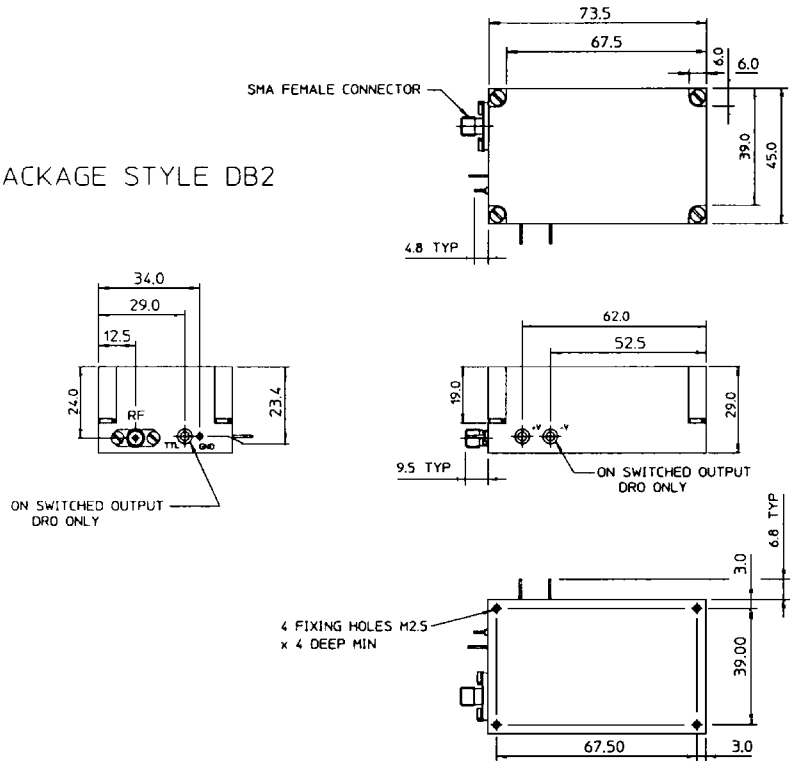
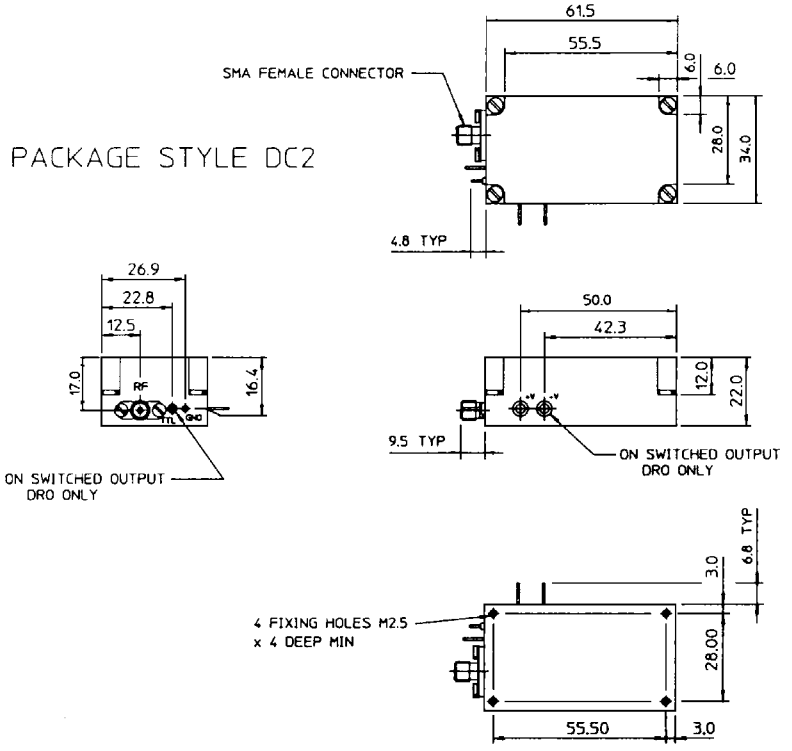
PACKAGE STYLE DB2



PACKAGE STYLE DC2



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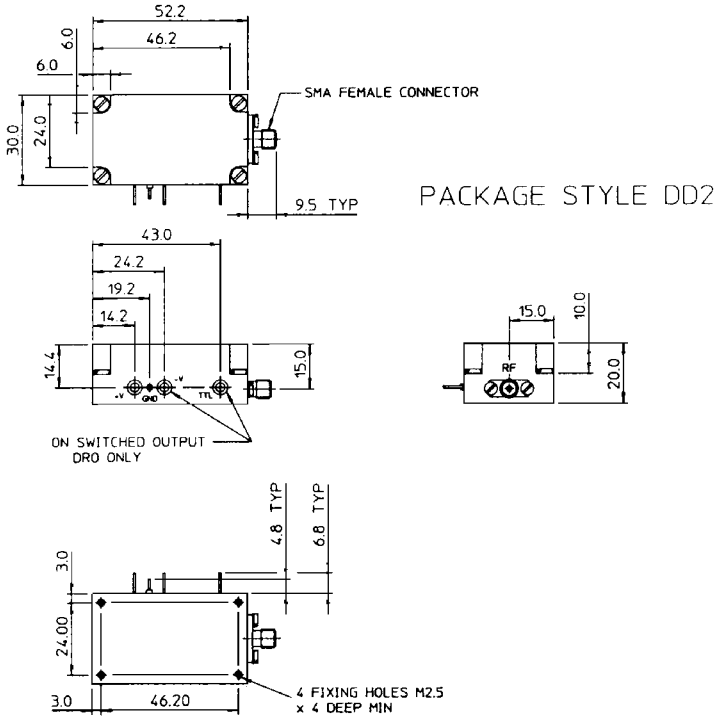

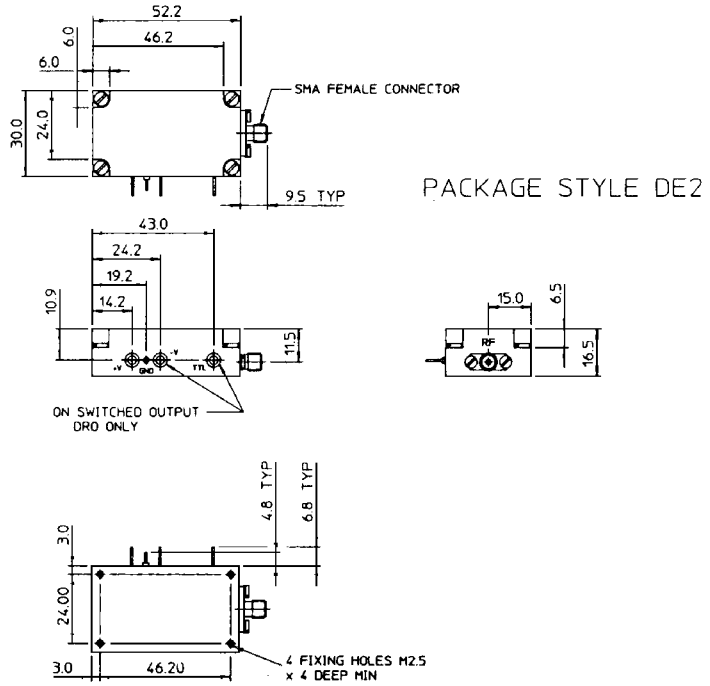

DRAWING NOTES

Third Angle Projection

All dimensions in mm

Tolerances x.x = ±0.5mm
x.xx = ±0.2mm

Standard Finish: Matt black paint to DTD 5555A

TTL and -V solder pins on Switched Output DROs only.