

SECTION 1.4

**TEMPERATURE COMPENSATED CRYSTAL
OSCILLATORS**

TEMPERATURE COMPENSATED OSCILLATORS (TCXO)

INTRODUCTION

1. Application and Technology Notes:

Temperature Compensated Crystal Oscillators (TCXO) are produced in frequencies from 1 up to 180 MHz. To reach the desired temperature stability curve a compensation network is added to the oscillator circuit. The compensation network has a negligible effect on the power consumption however allows temperature stability's down to ± 0.5 ppm. The addition of an external voltage control frequency adjustment means that long-term ageing can be recovered electronically therefore eliminating the need for costly system re-calibration.

The SMD TCXO series features the S1 and S7 making specifications for voice and data transmission applications available in Surface Mountable packaging.

The TCXO is well suited for applications where long-term reliability: low ageing, tight temperature stability and low power consumption are all requirements. Applications such as mobile communications and battery-powered systems are just two examples.

2. Code definition

DFA - Φ 16.384 MHz

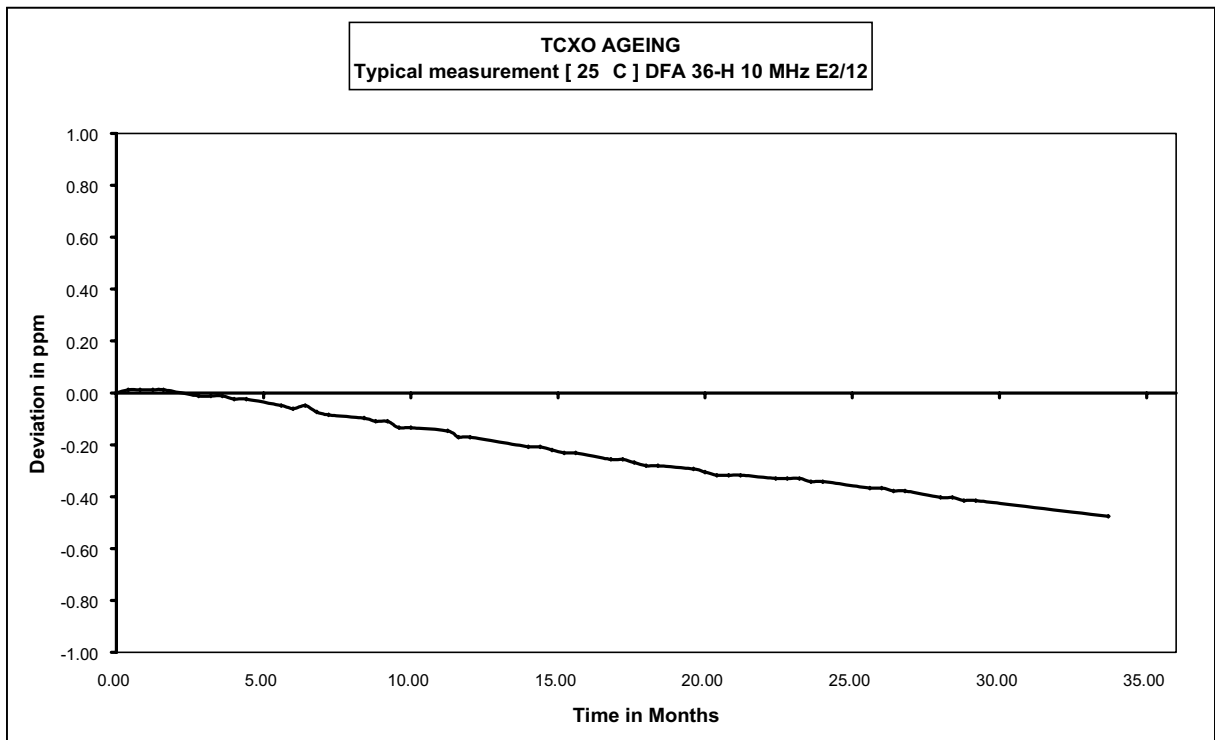
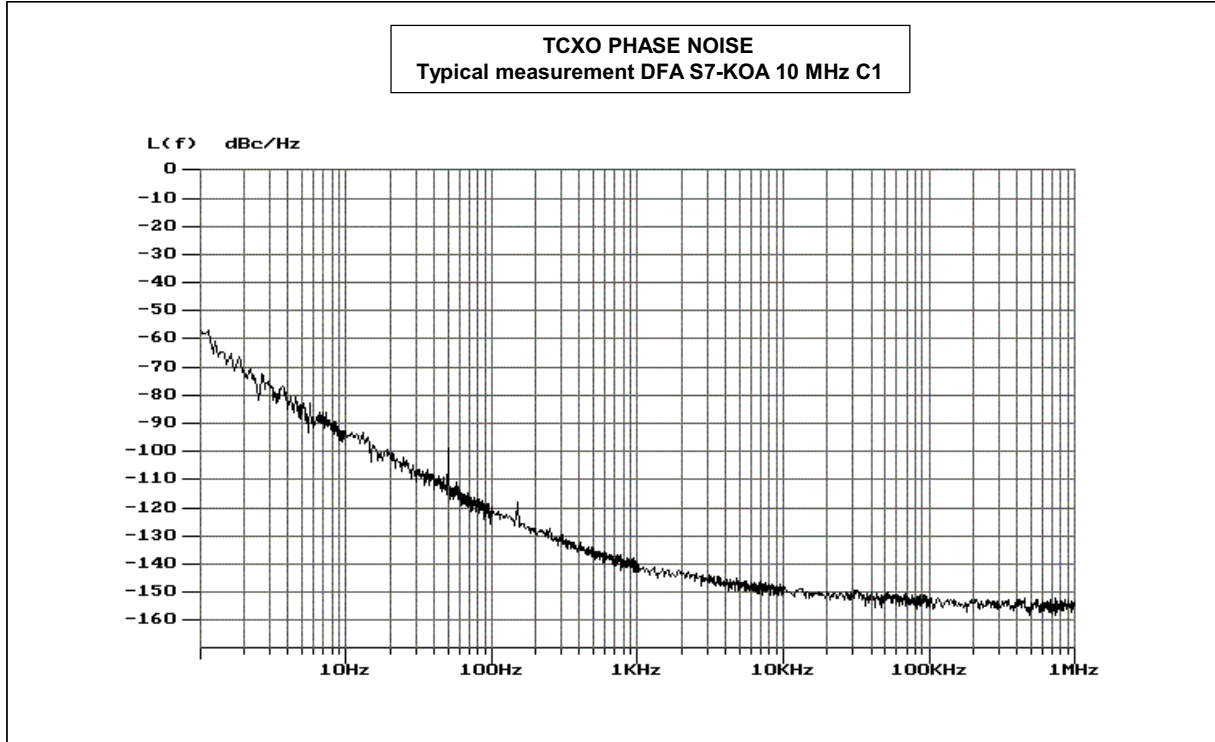
	Package Code [L x W x H mm]	Output Code	Option Code	Temperature Code	Temperature Stability
S M D	S1 = 15 x 9 x 6	H = HCMOS	A = internal trimmer	A = 0 to 50°C	0.5
	S2 = 8.2 x 5 x 3.2	E = ECL	R = tight symmetry	L = 0 to 60°C	1.0
	S3 = 9.1 x 7.2 x 1.8	EC = PECL	V = ext. volt. control	B = 0 to 70°C	2.0
	S7 = 20 x 13 x H	T = TTL	Y = ext. potent	D = -10 to 60°C	2.5
	S11 = 7 x 5 x 1.7	O = clipped sine	Z = tri-state output	C = -20 to 70°C	3.0
L E A D E D	S15 = 5 x 3.2 x 1.2	S = sine wave		P = -25 to 75°C	5.0
	14 = DIL 14 x H			R = -30 to 70°C	S3
	20 = 20 x 20 x H			N = -30 to 75°C	
	36 = 27 x 36 x H			T = -30 to 85°C	
				E = -40 to 85°C	

Some codes/options are product specific. Other codes/options also available. Please consult factory for details.
 Φ Internal codes for production use only. * A unique specification will be issued for custom requirements.

3. Detailed Specifications

Package	Description	Page No.
SMD	HCMOS, clipped sine wave, +5.0 V or +3 V supply	46 - 47
	Sine wave, +5.0 V to +3 V supply	48 - 49
	HCMOS, Tri-state, +5.0 or +3.3 V supply	50 - 52
	PECL, 150 - 180 MHz, +5.0 or +3.3 V supply	53
	HCMOS or clipped sine wave, +5.0 to +3.0 V supply	54 - 55
DIL 14	HCMOS or clipped sine, +5.0 V or +3.3 V supply	56
20 x 20 x 9.8	HCMOS or sine or clipped sine, +5 to +15.0 V supply	57
27 x 36 x 10	HCMOS or sine, 1 - 70 MHz, +5.0 to +15.0 V supply	58

**TEMPERATURE COMPENSATED OSCILLATORS (TCXO)
MEASUREMENT DATA**



ULTRA MINIATURE SURFACE MOUNT TCXO DFA S15-OV / UOV

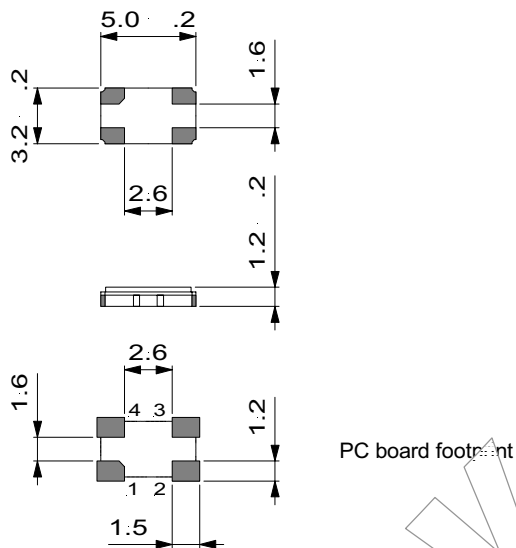
IDEAL FOR VOLUME APPLICATIONS

EXTERNAL VOLTAGE CONTROL

LOW PROFILE

STANDARD CERAMIC PACKAGE

Function	DFA S15
V control	1
GND	2
Output	3
Vcc	4



TYPE	DFA S15-OV	DFA S15-UOV
Frequency Range	10 to 30 MHz	10 to 30 MHz

ELECTRICAL SPECIFICATIONS	DFA S15-OV	DFA S15-UOV
supply voltage	5 V \pm 5 %	3.0 V \pm 5 %
supply current (no load)	\leq 2 mA	\leq 2 mA
output load	clipped sine wave 10 k Ω //10 pF	clipped sine wave 10 k Ω //10 pF
high/low levels or output amplitude	\geq 1.0 V p-p	\geq 0.7 V p-p
harmonics	\leq -3 dBc	\leq -3 dBc
start-up	\leq 4 ms @ 4.75 V	\leq 4 ms @ 2.85 V

FREQUENCY STABILITY			Detailed tolerances [ppm]				
type	temperature range	model code	temperature	stability versus :			calibration @ 25°C
				voltage \pm 5 %	load \pm 5 %	ageing	
all types	0 to 70°C	B1.5	$\leq \pm 1.5$	$\leq \pm 0.3$	$\leq \pm 0.2$	$\leq \pm 1$	$\leq \pm 2.5$
	-25 to 75°C	P2	$\leq \pm 1.5$	$\leq \pm 0.3$	$\leq \pm 0.2$	$\leq \pm 1$	$\leq \pm 2.5$
	-30 to 85°C	T2.5	$\leq \pm 2.5$	$\leq \pm 0.3$	$\leq \pm 0.2$	$\leq \pm 1$	$\leq \pm 2.5$
remark	ageing is 1 st year at 25°C						
voltage control (positive slope)	$\geq \pm 3$ ppm, $\leq \pm 7$ ppm 2.5 V \pm 2 V			$\geq \pm 3$ ppm, $\leq \pm 7$ ppm 1.5 V \pm 1.0V			

ORDERING CODE	type + option code + frequency + model code
Example	DFA S15-UOV 13 MHz P2

REMARK	Preliminary data sheet is subject to change without notice
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ULTRA MINIATURE SURFACE MOUNT TCXO DFA S11-OV / UOV

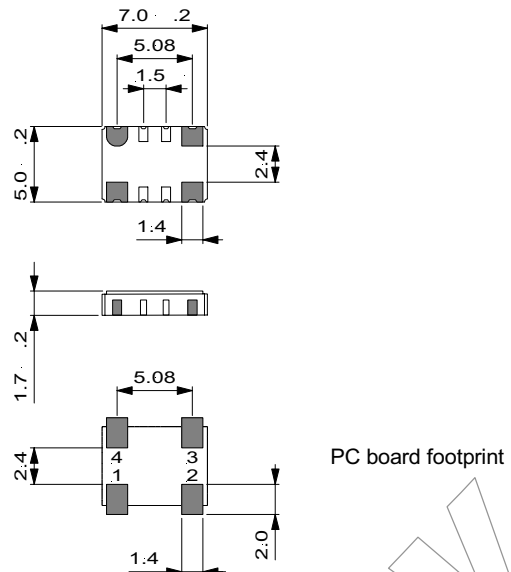
IDEAL FOR VOLUME APPLICATIONS

EXTERNAL VOLTAGE CONTROL

LOW PROFILE

STANDARD CERAMIC PACKAGE

Function	DFA S11
V control	1
GND	2
Output	3
Vcc	4



TYPE	DFA S11-OV	DFA S11-UOV
Frequency Range	10 to 30 MHz	10 to 30 MHz

ELECTRICAL SPECIFICATIONS	DFA S11-OV	DFA S11-UOV
supply voltage	5 V ± 5 %	3.0 V ± 5 %
supply current (no load)	≤ 2 mA	≤ 2 mA
output load	clipped sine wave 10 kΩ//10 pF	clipped sine wave 10 kΩ//10 pF
high/low levels or output amplitude	≥ 1.0 V p-p	≥ 0.7 V p-p
harmonics	≤ -3 dBc	≤ -3 dBc
start-up	≤ 4 ms @ 4.75 V	≤ 4 ms @ 2.85 V

FREQUENCY STABILITY			Detailed tolerances [ppm]				
type	temperature range	model code	temperature	Vcc ± 5 %	load ± 5 %	ageing	calibration @ 25°C
all types	0 to 70°C	B1.5	≤ ± 1.5	≤ ± 0.3	≤ ± 0.2	≤ ± 1	≤ ± 2.5
	-25 to 75°C	P2	≤ ± 2.0	≤ ± 0.3	≤ ± 0.2	≤ ± 1	≤ ± 2.5
	-30 to 85°C	T2.5	≤ ± 2.5	≤ ± 0.3	≤ ± 0.2	≤ ± 1	≤ ± 2.5
remark	ageing is 1 st year at 25°C						
voltage control (positive slope)	≥ ± 3 ppm, ≤ ± 7 ppm 2.5 V ± 2 V			≥ ± 3 ppm, ≤ ± 7 ppm 1.5 V ± 1.0V			

ORDERING CODE	type + option code + frequency + model code
Example	DFA S11-UOV 12.8 MHz T2.5

REMARK Preliminary data sheet is subject to change without notice

ULTRA MINIATURE SURFACE MOUNT TCXO

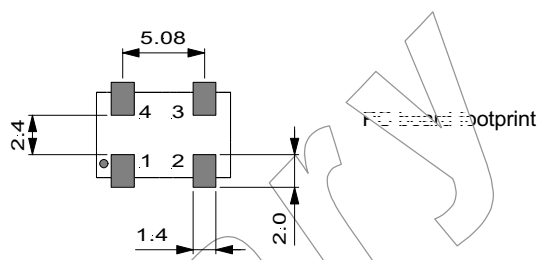
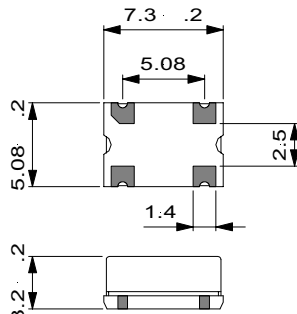
DFA S2-KS / LS / US

RECOMMENDED FOR NEW DESIGNS

CRYSTAL PACKED INTO ITS OWN HOLDER

EXTERNAL VOLTAGE CONTROL

TIGHT TEMPERATURE STABILITIES



Function	DFA S2
V control / GND	1
GND	2
Output	3
Vcc	4

PIN 1 TO BE GROUNDED IF NO CTRL VOLTAGE OPTION

TYPE	DFA S2-KS	DFA S2-LS	DFA S2-US
Frequency Range	10 to 20 MHz	10 to 20 MHz	10 to 20 MHz

ELECTRICAL SPECIFICATIONS			
supply voltage	5 V ± 5 %	3.3 V ± 5 %	3.0 V ± 5 %
supply current (no load)	≤ 2 mA	≤ 2 mA	≤ 2 mA
output load	sine wave 10 kΩ//10 pF	sine wave 10 kΩ//10 pF	sine wave 10 kΩ//10 pF
high/low levels or output amplitude	≥ 1.0 V p-p	≥ 1.0 V p-p	≥ 1.0 V p-p
harmonics	≤ -25 dBc	≤ -25 dBc	≤ -25 dBc
spurious	≤ -70 dBc	≤ -70 dBc	≤ -70 dBc
start-up	≤ 10 ms @ 75 V	≤ 10 ms @ 3.15 V	≤ 10 ms @ 2.85 V

FREQUENCY STABILITY		detailed tolerances [ppm]					
type	temperature range	model code	temperature	stability versus :			calibration @ 25°C
				Vcc ± 5 %	load ± 10 %	ageing	
all types	0 to 70°C	B0.5	≤ ± 0.5	≤ ± 0.3	≤ ± 0.3	≤ ± 1	≤ ± 1
	-20 to 70°C	C1.5	≤ ± 1.5				
	-30 to +75°C	N2.5	≤ ± 2.5				
remark				ageing is 1 st year at 25°C			

OPTIONS	CODE			
voltage control (positive slope)	V	≥ ± 5ppm, ≤ ± 15 ppm 2.5 V ± 2 V	≥ ± 5 ppm, ≤ ± 15 ppm 1.65 V ± 1.35 V	≥ ± 5 ppm, ≤ ± 15 ppm 1.5 V ± 1.0V

ORDERING CODE	type + option code + frequency + model code
Example	DFA S2-LSV 12.8 MHz B0.5

REMARK Preliminary data sheet is subject to change without notice

LOW POWER MINIATURE SURFACE MOUNT TCXO
DFA S3-KS / LS / US

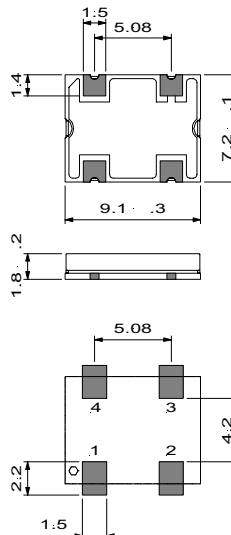
RECOMMENDED FOR NEW DESIGNS

CRYSTAL PACKED INTO ITS OWN HOLDER

IDEAL FOR VOLUME APPLICATIONS

EXTERNAL VOLTAGE CONTROL

LOW PROFILE



PC board footprint

Function	DFA S3
V control / GND	1
GND	2
Output	3
Vcc	4
PIN 1 TO BE GROUNDED IF NO CTRL VOLTAGE OPTION	

TYPE	DFA S3-KS	DFA S3-LS	DFA S3-US
Frequency Range	10 to 20 MHz	10 to 20 MHz	10 to 20 MHz

ELECTRICAL SPECIFICATIONS	DFA S3-KS	DFA S3-LS	DFA S3-US
supply voltage	5 V ± 5 %	3.3 V ± 5 %	3.0 V ± 5 %
supply current (no load)	≤ 2 mA	≤ 2 mA	≤ 2 mA
output load	sine wave 10 kΩ//10 pF	sine wave 10 kΩ//10 pF	sine wave 10 kΩ//10 pF
high/low levels or output amplitude	≥ 1.0 V p-p	≥ 1.0 V p-p	≥ 1.0 V p-p
harmonics	≤ -25 dBc	≤ -25 dBc	≤ -25 dBc
spurious	≤ -70 dBc	≤ -70 dBc	≤ -70 dBc
start-up	≤ 10 ms @ 4.75 V	≤ 10 ms @ 3.15 V	≤ 10 ms @ 2.85 V

FREQUENCY STABILITY			detailed tolerances [ppm]			
type	temperature range	model code	temperature	stability versus :		calibration @ 25°C
				Vcc ± 5 %	load ± 10 %	ageing
all types	0 to 70°C	B0.5	≤ ± 0.5	≤ ± 0.3	≤ ± 0.3	≤ ± 1
	-20 to 70°C	C1.5	≤ ± 1.5			
	-30 to +75°C	N2.5	≤ ± 2.5			
remark	ageing is 1 st year at 25°C					

OPTIONS	CODE	DFA S3-KS	DFA S3-LS	DFA S3-US
voltage control (positive slope)	V	≥ ± 5ppm, ≤ ± 15 ppm 2.5 V ± 2 V	≥ ± 5 ppm, ≤ ± 15 ppm 1.65 V ± 1.35 V	≥ ± 5 ppm, ≤ ± 15 ppm 1.5 V ± 1.0V

ORDERING CODE	type + option code + frequency + model code
Example	DFA S3-KSV 19.44 MHz N2.5

LOW POWER MINIATURE SURFACE MOUNT TCXO
DFA S3-KH (5 V) & LH (3.3 V)

RECOMMENDED FOR NEW DESIGNS

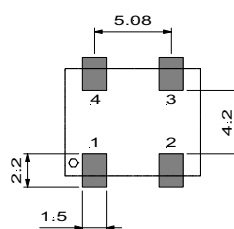
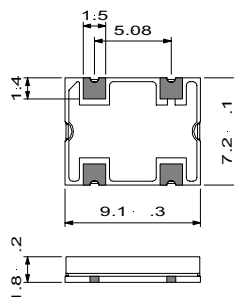
HCMOS OUTPUT

CRYSTAL PACKED INTO ITS OWN HOLDER

EXTERNAL VOLTAGE CONTROL

LOW PROFILE

Function	DFA S3
V control / GND	1
GND	2
Output	3
Vcc	4
PIN 1 TO BE GROUNDED IF NO CTRL VOLTAGE OPTION	



PC board footprint

TYPE	DFA S3-KH	DFA S3-LH
Frequency Range	5 to 25 MHz	5 to 25 MHz

ELECTRICAL SPECIFICATIONS	DFA S3-KH	DFA S3-LH
supply voltage	5 V ± 5 %	3.3 V ± 5 %
supply current (no load)	≤ 20 mA	≤ 10 mA
output load	HCMOS 15 pF or 2 TTL	HCMOS 15 pF or 2 TTL
duty cycle @ 50% level	45/55...55/45 %	45/55...55/45 %
rise/fall times (10 to 90 %)	≤ 5 ns	≤ 5 ns
high/low levels or output amplitude	≥ 4.5 V / ≤ 0.5 V	≥ 2.8 V / ≤ 0.3 V
start-up	≤ 10 ms @ 5 V	≤ 10 ms @ 3.15 V

FREQUENCY STABILITY			detailed tolerances [ppm]				
type	temperature range	model code	temperature	stability versus :			calibration @ 25°C
				Vcc ± 5 %	load ± 10 %	ageing	
all types	0 to 70°C	B0.5	≤ ± 0.5	≤ ± 0.3	≤ ± 0.1	≤ ± 1	≤ ± 1
	-20 to 70°C	C1.5	≤ ± 1.5				
	-30 to +75°C	N2.5	≤ ± 2.5				
remark			ageing is 1 st year at 25°C				

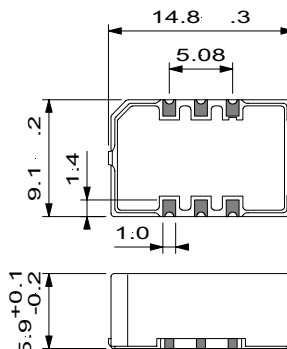
OPTIONS	CODE	DFA S3-KH	DFA S3-LH
voltage control (positive slope)	V	≥ ± 5ppm, ≤ ± 15 ppm 2.5 V ± 2 V	≥ ± 5 ppm, ≤ ± 15 ppm 1.65 V ± 1.35 V

ORDERING CODE	type + option code + frequency + model code
Example	DFA S3-KHV 19.44 MHz N2.5

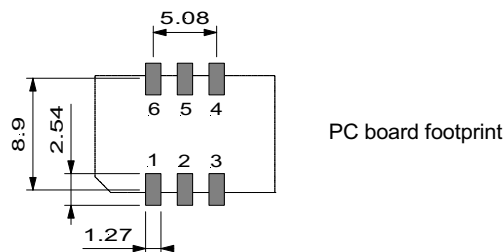
MINIATURE SURFACE MOUNT TCXO

DFA S1-KHZ (5 V) & DFA S1-LHZ (3.3 V)

- RECOMMENDED FOR NEW DESIGNS
- CRYSTAL PACKED INTO ITS OWN HOLDER
- TIGHT TEMPERATURE STABILITIES
- EXTERNAL VOLTAGE CONTROL
- LOW PROFILE



Function	DFA S1
V control / NC	1
E / D	2
GND	3
Output	4
N / C	5
Vcc	6



TYPE	DFA S1-KHZ	DFA S1-LHZ
Frequency Range	2 to 25 MHz	2 to 25 MHz

ELECTRICAL SPECIFICATIONS	DFA S1-KHZ	DFA S1-LHZ
supply voltage	5 V ± 5 %	3.3 V ± 5 %
supply current (no load)	≤ 20 mA	≤ 10 mA
output load	HCMOS 15 pF or 2 TTL	HCMOS 15 pF or 2 TTL
duty cycle @ 50% level	45/55...55/45 %	45/55...55/45 %
rise/fall times (10 to 90 %)	≤ 5 ns	≤ 5 ns
high/low levels or output amplitude	≥ 4.5 V / ≤ 0.5 V	≥ 2.8 V / ≤ 0.3 V
start-up	≤ 10 ms @ 4.75 V	≤ 10 ms @ 3.15 V
tri-state control on pin 2	High or open = enable, low = high Z	High or open = enable, low = high Z

FREQUENCY STABILITY			detailed tolerances [ppm]				
type	temperature range	model code	stability versus :				calibration @ 25°C
			temperature	Vcc ± 5 %	load ± 10 %	ageing	
all types	0 to 70°C	B0.5	≤ ± 0.5	≤ ± 0.3	≤ ± 0.1	≤ ± 1	≤ ± 1
	-20 to 70°C	C1.5	≤ ± 1.5				
	-30 to +75°C	N2.5	≤ ± 2.5				
remark			ageing is 1 st year at 25°C				

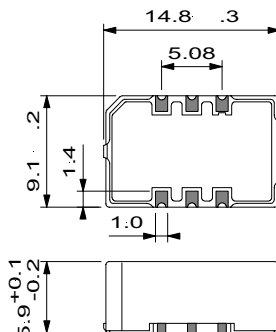
OPTIONS	CODE	DFA S1-KHZ	DFA S1-LHZ
voltage control on pin 1 (positive slope)	V	≥ ± 5ppm, ≤ ± 15 ppm 2.5 V ± 2 V	≥ ± 5 ppm, ≤ ± 15 ppm 1.65 V ± 1.35 V

ORDERING CODE	type + option code + frequency + model code
Example	DFA S1-KHZV 19.44 MHz N2.5

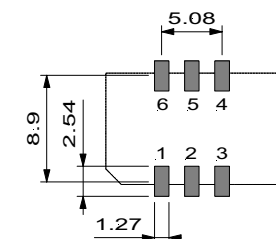
STRATUM III MINIATURE SMD TCXO

DFA S1-KHZ (5 V) & DFA S1-LHZ (3.3 V)

- STRATUM III COMPLIANT
- CRYSTAL PACKED INTO ITS OWN HOLDER
- IDEAL FOR VOLUME APPLICATIONS
- EXTERNAL VOLTAGE CONTROL
- LOW PROFILE



Function	DFA S1
NC	1
E / D	2
GND	3
Output	4
NC	5
Vcc	6



TYPE	DFA S1-KHZ	DFA S1-LHZ
Frequency Range	10 to 20 MHz	10 to 20 MHz
Standard frequencies	12.8, 16.384, 19.44 & 20 MHz	12.8, 16.384, 19.44 & 20 MHz

ELECTRICAL SPECIFICATIONS	DFA S1-KHZ	DFA S1-LHZ
supply voltage	5 V ± 5 %	3.3 V ± 5 %
supply current (no load)	≤ 20 mA	≤ 10 mA
output load	HCMOS 15 pF or 2 TTL	HCMOS 15 pF or 2 TTL
duty cycle @ 50% level	45/55...55/45 %	45/55...55/45 %
rise/fall times (10 to 90 %)	≤ 5 ns	≤ 5 ns
high/low levels or output amplitude	≥ 2.8 V / ≤ 0.3 V	≥ 2.8 V / ≤ 0.3 V
start-up	≤ 10 ms @ 4.75 V	≤ 10 ms @ 3.15 V
tri-state control on pin 2	high or open = enable, low = high Z	high or open = enable, low = high Z

FREQUENCY STABILITY		detailed tolerances [ppm]					
type	temperature range	model code	stability versus : temperature	Vcc ± 5 %	ageing	Overall stability	Calibration @ 25°C
all types	0 to 50°C	AS3	± 0.28	≤ ± 0.3	≤ ± 3 over 15 years	≤ ± 4.6 over 15 years	≤ ± 0.8
	0 to 70°C	S3	≤ ± 0.5				

ORDERING CODE	type + option code + frequency + model code
Example	DFA S1-LHZ 19.44 MHz AS3

REMARK	Preliminary data sheet is subject to change without notice
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MINIATURE SURFACE MOUNT TCXO

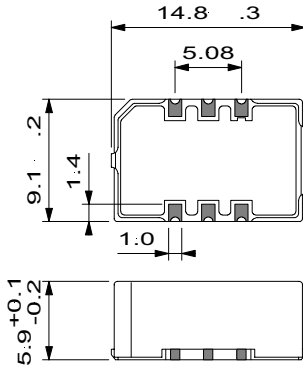
DFA S1-KECPI (5 V) & DFA S1-LECPI (3.3 V)

CRYSTAL PACKED INTO ITS OWN HOLDER

5 V OR 3.3 V SUPPLY VOLTAGE

STANDARD EPOXY PACKAGE

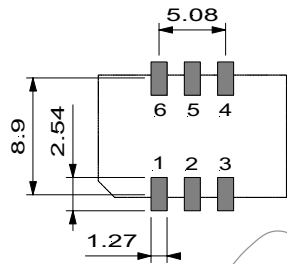
HIGH FREQUENCIES



Marking:

DFA S1-KE/LE
Frequency
Code yrwk

Function	DFA S1-KE / LE
Output 2	1
E / D	2
GND	3
Output 1	4
N/C	5
Vcc	6



PCB footprint

TYPE	DFA S1-KECPI	DFA S1-LECPI
Frequency Range	150 to 180 MHz	150 to 180 MHz
Standard Frequencies	155.520, 171.990 and 178.990 MHz	

ELECTRICAL SPECIFICATIONS	DFA S1-KECPI	DFA S1-LECPI
supply voltage	5 V ± 5 %	3.3 V ± 5 %
supply current (no load)	≤ 75 mA	≤ 65 mA
output load	PECL 100 K (50 Ω to 3 V)	LVPECL 100 K (50 Ω to 1.3 V)
duty cycle @ 50% level	45/55...55/45 %	45/55...55/45 %
rise/fall times (20 to 80%)	≤ 0.5 ns	≤ 0.5 ns
high/low levels	≥ 2.22 V / ≤ 2.45 V	≥ 2.22 V / ≤ 1.7 V
jitter RMS (12 kHz to 5 MHz)	≤ 5 ps	≤ 0.5 ps
enable / disable on pin 2	low or open = enable, high = disable	low or open = enable, high = disable
complementary output on pin 1	180° phase shifted	180° phase shifted
start up	≤ 10 ms @ 4.5 V	≤ 10 ms @ 3.15 V

FREQUENCY STABILITY		detailed tolerances [ppm]						
type	temperature range	model code	temperature	stability versus : Vcc ± 2.5 %		ageing	Overall stability	Calibration @ 25°C
all types	-40 to 85°C	R10B	± 3 typ	± 0.5 typ		± 2.5 over 10 years typ	≤ ± 10 over 10 years	± 2 typ
	-40 to 85°C	R10B	± 5 typ					

ORDERING CODE	type + option code + frequency + stability / temperature code
Example	DFA S1-LECPI 178.944 MHz XE10B

SURFACE MOUNT MINIATURE TCXO

DFA S7-KHZ (5 V) & DFA S7-LHZ (3.3 V)

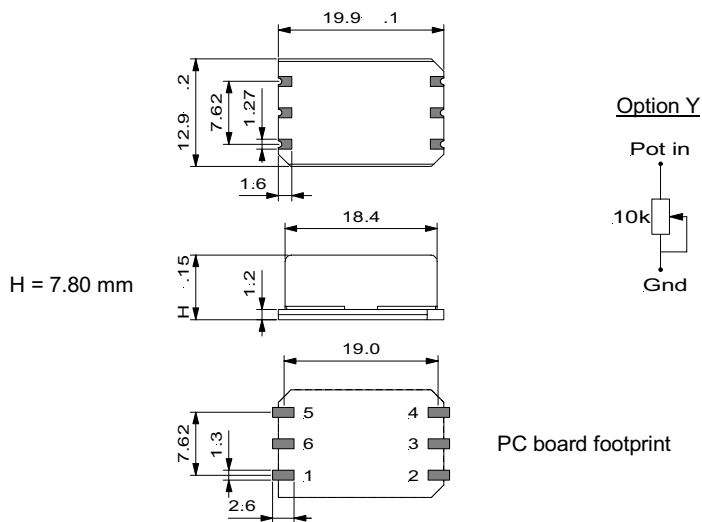
RECOMMENDED FOR NEW DESIGNS

SURFACE MOUNTABLE PACKAGE

5 V OR 3.3 V SUPPLY VOLTAGE

TIGHT STABILITY

Function	DFA S7
NC / Pot in / Vco	1
GND	2
N / C	3
Output	4
Vcc	5
E / D	6



TYPE	DFA S7-KHZ	DFA S7-LHZ
Frequency Range	2 to 52 MHz	2 to 45 MHz

ELECTRICAL SPECIFICATIONS		DFA S7-KHZ	DFA S7-LHZ
supply voltage		5 V ± 5 %	3.3 V ± 5 %
supply current (no load)	≤ 25 MHz	≤ 20 mA	≤ 10 mA
	≤ 35 MHz	≤ 30 mA	≤ 15 mA
	> 35 MHz	≤ 40 mA	≤ 20 mA
duty cycle @ 2.5V (LH @ 1.65 V)			
rise/fall times (10 to 90 %)			
high/low levels or output amplitude			
start-up		≤ 10 ms @ 4.75V	≤ 10 ms @ 3.15V
tri-state control on pin 6	High or open = enable, low = high Z		
remark	duty cycle for frequencies > 30 MHz is 40/60%...60/40%		

FREQUENCY STABILITY			detailed tolerances [ppm]			
type	temperature range	model code	stability versus :			
			temperature	Vcc range	load ± 10 %	Ageing
all types	-10 to 60°C	D1	≤ ± 1	≤ ± 0.1	≤ ± 0.1	≤ ± 1
	-20 to 70°C	C1	≤ ± 1			
	-30 to 75°C	C2	≤ ± 2			
DFA S7-K type	-40 to 85°C	E3	≤ ± 3	≤ ± 0.1	≤ ± 0.1	≤ ± 1
remarks	factory calibration if no trimming option ≤ ± 1 ppm ageing is 1 st year at 25°C					

OPTIONS	CODE	
external voltage control	V	DFA S7-K : 2.5 V ± 2 V ≥ ± 5 ppm, positive slope
internal trimmer	A	DFA S7-L : 1.5 V ± 1.5 V ≥ ± 5 ppm, positive slope
external potentiometer	Y	≥ ± 5 ppm 10 kΩ ≥ ± 5 ppm, between pin 1 and GND (not available with internal trimmer)

ORDERING CODE	type + option code + frequency + model code
Example	DFA S7-KHZ 16.384 MHz E3

SURFACE MOUNT MINIATURE TCXO

DFA S7-K (5 V) & DFA S7-L (3.3 V)

RECOMMENDED FOR NEW DESIGNS

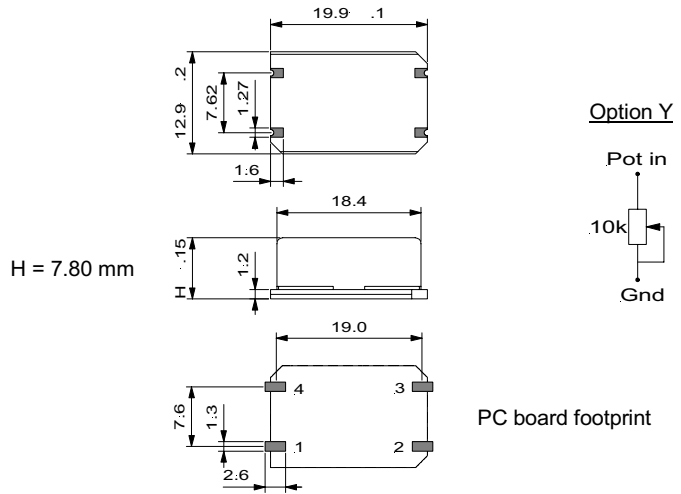
SURFACE MOUNTABLE PACKAGE

5 V OR 3.3 V SUPPLY VOLTAGE

INTERNAL ADJUSTMENT

VERY HIGH STABILITY

Function	DFA S7
NC/Pot in/Vco	1
GND	2
Output	3
Vcc	4



TYPE	DFA S7-KH	DFA S7-KO	DFA S7-LH	DFA S7-LO
Frequency Range	2 to 52 MHz	2 to 52 MHz	2 to 45 MHz	2 to 45 MHz

ELECTRICAL SPECIFICATIONS		DFA S7-KH	DFA S7-KO	DFA S7-LH	DFA S7-LO
supply voltage		5 V ± 5 %	5 V ± 5 %	3.2 V to 3.6 V	3.2 V to 3.6 V
supply current (no load)	≤ 25 MHz ≤ 35 MHz > 35 MHz	≤ 10 mA ≤ 20 mA ≤ 30 mA	≤ 5 mA ≤ 20 mA ≤ 30 mA	≤ 5 mA ≤ 15 mA ≤ 20 mA	≤ 5 mA ≤ 15 mA ≤ 20 mA
output load		HCMOS 15 pF or 2 TTL	clipped sine 20kΩ//5 pF	HCMOS 15 pF or 1 TTL	clipped sine 20kΩ//5 pF
duty cycle @ 2.5V (LH @ 1.65 V)		≤ 45/55...55/45 %		≤ 45/55...55/45 %	
rise/fall times (10 to 90 %)		≤ 10 ns		≤ 10 ns	
high/low levels or output amplitude		≥ 3.5 V / ≤ 0.5 V	≥ 2 V p-p	≥ 2.7 V / ≤ 0.2 V	≥ 1.5 V p-p
start-up		≤ 10 ms @ 4.75V	≤ 10 ms @ 4.75V	≤ 10 ms @ 3.2V	≤ 10 ms @ 3.2V
remarks	duty cycle for frequencies > 30 MHz is 40/60%...60/40%				

FREQUENCY STABILITY			detailed tolerances [ppm]			
type	temperature range	model code	stability versus :			
			temperature	Vcc range	load ± 10 %	ageing
all types	-10 to 60°C	D1	≤ ± 1	≤ ± 0.1	≤ ± 0.1	≤ ± 1
	-20 to 70°C	C1	≤ ± 1			
	-30 to 75°C	C2	≤ ± 2			
DFA S7-K types	-40 to 85°C	E5	≤ ± 5	≤ ± 0.1	≤ ± 0.1	≤ ± 1
		E3	≤ ± 3			
		E2	≤ ± 2			
remarks	factory calibration if no trimming option ≤ ± 1 ppm					
	ageing is 1 st year at 25°C					
	DFA S7-L : Vcc range ≤ ± 0.3 ppm (f ≥ 30 MHz)					

OPTIONS	CODE	
external voltage control	V	DFA S7-K : 2.5 V ± 2 V ≥ ± 5 ppm, positive slope DFA S7-L : 1.5 V ± 1.5 V ≥ ± 5 ppm, positive slope
internal trimmer	A	≥ ± 5 ppm
external potentiometer	Y	10 kΩ ≥ ± 5 ppm, between pin 1 and GND (not available with internal trimmer)

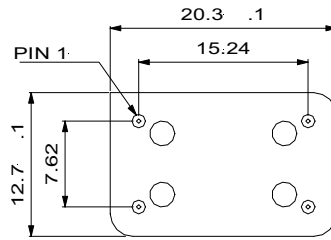
ORDERING CODE	type + option code + frequency + model code
Example	DFA S7-KH 16.384 MHz E2

DIL 14 PACKAGE TCXO
DFA 14-K (5 V) & DFA 14-L (3.3 V)

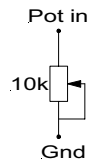
STANDARD MINIATURE DIL 14 PACKAGE

WIDE TEMPERATURE RANGE

HIGH FREQUENCY STABILITY

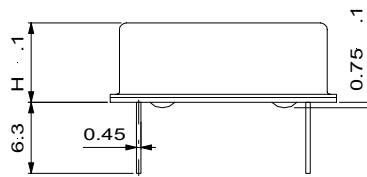


Option Y



Function	DFA 14
NC/Pot in/Vco	1
GND	7
Output	8
Vcc	14

H = 8.50 mm



TYPE	DFA 14-KH	DFA 14-KO	DFA 14-LH	DFA 14-LO
Frequency Range	2 to 52 MHz	2 to 52 MHz	2 to 45 MHz	2 to 45 MHz

ELECTRICAL SPECIFICATIONS		DFA 14-KH	DFA 14-KO	DFA 14-LH	DFA 14-LO
supply voltage		5 V ± 5 %	5 V ± 5 %	3.2 V to 3.6 V	3.2 V to 3.6 V
supply current (no load)	≤ 25 MHz	≤ 10 mA	≤ 5 mA	≤ 5 mA	≤ 5 mA
	≤ 35 MHz	≤ 20 mA	≤ 20 mA	≤ 15 mA	≤ 15 mA
	> 35 MHz	≤ 30 mA	≤ 30 mA	≤ 20 mA	≤ 20 mA
output load		HCMOS 15 pF or 2 TTL	clipped sine 20kΩ/5 pF	HCMOS 15 pF or 1 TTL	clipped sine 20kΩ/5 pF
duty cycle @ 2.5V (LH @ 1.65 V)		≤ 45/55...55/45 %		≤ 45/55...55/45 %	
rise/fall times (10 to 90 %)		≤ 10 ns		≤ 10 ns	
high/low levels or output amplitude		≥ 3.5 V / ≤ 0.5 V	≥ 2 V p-p	≥ 2.7 V / ≤ 0.2 V	≥ 1.5 V p-p
start-up		≤ 10 ms @ 4.75V	≤ 10 ms @ 4.75V	≤ 10 ms @ 3.2V	≤ 10 ms @ 3.2V
remarks	duty cycle for frequencies > 30 MHz is 40/60%...60/40%				

FREQUENCY STABILITY			detailed tolerances [ppm]			
type	temperature range	model code	stability versus :			
			temperature	Vcc range	load ± 10 %	ageing
all types	-10 to 60°C	D1	≤ ± 1	≤ ± 0.1	≤ ± 0.1	≤ ± 1
	-20 to 70°C	C1	≤ ± 1			
		C2	≤ ± 2			
	-30 to 75°C	N2	≤ ± 2			
DFA 14-K types	-40 to 85°C	E5	≤ ± 5	≤ ± 0.1	≤ ± 0.1	≤ ± 1
		E3	≤ ± 3			
		E2	≤ ± 2			
remarks			factory calibration if no trimming option ≤ ± 1 ppm			
			ageing is 1 st year at 25°C			
			DFA S7-L : Vcc range ≤ ± 0.3 ppm (f ≥ 30 MHz)			

OPTIONS	CODE	
external voltage control	V	DFA 14-K : 2.5 V ± 2 V ≥ ± 5 ppm, positive slope
internal trimmer	A	DFA 14-L : 1.5 V ± 1.5 V ≥ ± 5 ppm, positive slope
external potentiometer	Y	≥ ± 5 ppm 10 kΩ ≥ ± 5 ppm (not available with internal trimmer)

ORDERING CODE	type + option code + frequency + model code
Example	DFA 14-KHAV 8.192 MHz E2

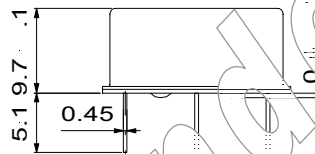
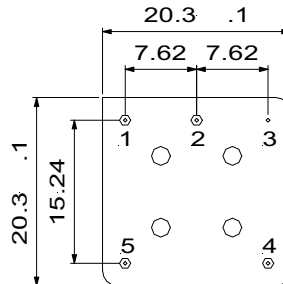
HIGH STABILITY SMALL SIZE TCXO DFA 20

OPTIONAL EXTERNAL VOLTAGE CONTROL

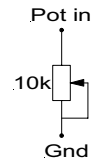
VERY HIGH OVERALL STABILITY

STANDARD PACKAGE

LOW AGEING



Option Y



Function	DFA 20
Vcc	1
Output	2
GND	3
GND/Pot in/Vco	4
GND	5

TYPE	DFA 20-H	DFA 20-H	DFA 20-S	DFA 20-O
Frequency Range (MHz)	1 to 27	25 to 30	4 to 27	1 to 27

ELECTRICAL SPECIFICATIONS				
supply voltage		5 to 15 V ± 5 %	5 to 15 V ± 5 %	5 to 15 V ± 5 %
supply current (no load)	≤ 25 MHz	≤ 7 mA	≤ 20 mA	≤ 7 mA
	> 25 MHz	≤ 30 mA	≥ 30 mA	≤ 10 mA
output load		HCMOS 15 pF or 2 TTL	Sine 50 Ω ± 10 %	clipped sine 20 kΩ/5 pF
duty cycle @ 2.5 V		≤ 40/60...60/40 %		
rise/fall times		≤ 10 ns		
high/low levels or output amplitude		≥ 3.5/ ≤ 0.5 V	0 dBm ± 2 dB	≥ 2 V p-p
start-up		≤ 10 ms	≤ 10 ms	≤ 10 ms

FREQUENCY STABILITY		Detailed tolerances [ppm]		
types	temperature range	model code	temperature	stability versus :
				Vcc ± 5 %
				load ± 10 %
				ageing
all types	0 to 50°C	A0.5	≤ ± 0.5	≤ ± 0.1
	-10 to 60°C	D1	≤ +1	
	0 to 70°C	C1	≤ ± 1	
	0 to 70°C	C2	≤ ± 2	
	0 to 75°C	N2	≤ ± 2	
	-40 to 85°C	E3	≤ ± 3	≤ ± 1
remarks	Factory calibration if no trimming option ≤ ± 1 ppm ageing is 1 st year at 25°C			

OPTIONS	
external voltage	2.5 ± 2 V ≥ ± 5 ppm , positive slope
internal trimmer	≥ ± 5 ppm
external potentiometer	10 kΩ ≥ ± 5 ppm (not available with internal trimmer)

ORDERING CODE	type + option code + frequency + model code/ voltage value
Example	DFA 20-HA 12.288 MHz N2/5

HIGH STABILITY STANDARD SIZE TCXO

DFA 36

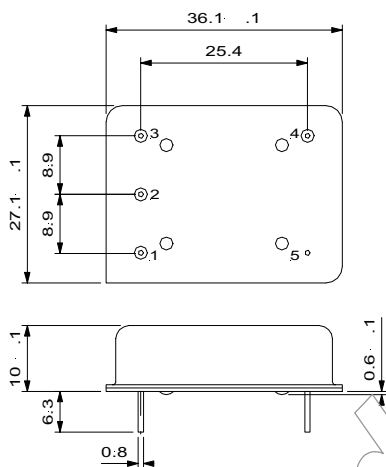
EXTERNAL POTENTIOMETER ADJUSTMENT

VERY HIGH OVERALL STABILITY

STANDARD PACKAGE

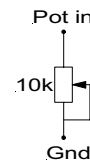
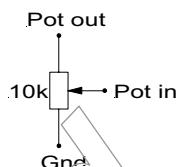
LOW AGEING

Function	DFA 36
NC/Pot in / VCO	1
NC/Pot out	2
Vcc	3
Output	4
GND	5



Standard

Option Y



MS models supplied in sealed package. Please consult factory for details.

TYPE	DFA 36-H	DFA 36-MH	DFA 36-S	DFA 36-MS
Frequency Range (MHz)	1 to 27	25 to 70	3 to 27	25 to 70

ELECTRICAL SPECIFICATIONS		DFA 36-H	DFA 36-MH	DFA 36-S	DFA 36-MS
supply voltage		5 to 15 V ± 5 %		5 to 15 V ± 5 %	
supply current (no load)	≤ 25 MHz	≤ 10 mA		≤ 20 mA	
	> 25 MHz	≤ 30 mA		≤ 40 mA	
output load		HCMOS 10 pF or TTL		Line Load ± 10 %	
duty cycle @ 2.5 V		40/60, 50/50 %			
rise/fall times		≤ 10 ns			
high/low levels or output amplitude		3.5 ± 0.5 V		0 dBm ± 2 dB	
start-up		≤ 10 ms		≤ 10 ms	

FREQUENCY STABILITY			detailed tolerances [ppm]				
types	temperature range	model code	temperature	Vcc ± 5 %	load ± 10 %	ageing	potentiometer pulling range
all types	-10 to 60°C	E0.5	≤ ± 0.5	≤ ± 0.1	≤ ± 0.1	≤ ± 1	≥ ± 5
		E1	≤ ± 1				
	-20 to 70°C	E2	≤ ± 1				
		E3	≤ ± 2				
-40 to 85°C	E2	≤ ± 2					
		E3	≤ ± 3				
remarks	external potentiometer value 10 kΩ						
	factory calibration if no trimming option ≤ ± 1 ppm						
	ageing is 1 st year at 25°C						

OPTIONS	CODE	
internal trimmer	A	≥ ± 5 ppm
external 2 point potentiometer	Y	10 kΩ ≥ ± 5 ppm, between pin 1 and GND
external voltage	V-	2.5 ± 2 V ≥ ± 5 ppm , negative slope
	V+	2.5 ± 2 V ≥ ± 5 ppm , positive slope

ORDERING CODE	type + option code + frequency + model code / voltage value
Example	DFA 36-HA 16.384 MHz E2/12