

HTJF538 Series**200 fsec typical Phase Jitter
CMOS, Ultra-low Jitter Crystal Oscillators (XOs)****MERCURY**
Since 1973

HTJF538 series (5.0x3.2x1.4 mm, 8 pads), a member of Mercury QuikXO™ quick-turn clock oscillators, features CMOS output and femto-second (f. sec.) RMS phase jitter (157 f. sec. for 250 MHz at 3.3V, 12 KHz to 20 MHz). Operating voltages are 1.8V, 2.5V or 3.3V. Applications include networking, wireless infrastructure, high resolution audio and video, high-speed data converters and storage area networks. Differential outputs (LVPECL, LVDS, HCSL, CML) up to 2.1 GHz is also available.



Related Products: Click the product series ([underlined](#)) to open the spec. sheet link.

Package Size Output Logic Product Type	7.0 x 5.0 x 1.8 mm (8 pads) Package code: 578		5.0 x 3.2 x 1.4 mm (8 pads) Package code: 538	
	Output Logic code: "T"	Differential output code: "x" ⁽¹⁾	CMOS output code: "T"	Differential output code: "x" ⁽¹⁾
Clock Oscillators (XOs); "H"	HTJF578	HxJF578	This series	HxJF538
Voltage Controlled Crystal Oscillators (VCXOs); "G"	GTJF578	GxJF578	GTJF538	GxJF538

⁽¹⁾ Differential output logics "x" include LVPECL ("P"), LVDS ("D"), HCSL ("C") or CML ("Q").

General Specifications: at Ta=+25°C, CL=15 pF

Product Type	Crystal Oscillator (XO)		
Power Supply Voltage (V _{DD})	1.8V±5%	2.5V±10%	3.3V±10%
Frequency Range	150~250MHz	150~250MHz	150~250MHz
Load	15pF max.	15pF max.	15pF max.
Output "High" Voltage; V _{OH}	V _{DD} - 0.4V min.	V _{DD} - 0.4V min.	V _{DD} - 0.4V min.
Output "Low" Voltage; V _{OL}	50~200MHz: V _{DD} x 0.1 max. 201~250MHz: 0.3V max.	V _{DD} x 0.1 max.	V _{DD} x 0.1 max.
Rise Time (Tr) / Fall Time (Tf) (10% ↔ 90% waveform)	1.0 nsec. typ. 5.0 nsec. max.	1.0 nsec. typ. 5.0 nsec. max.	1.0 nsec. typ. 5.0 nsec. max.
Duty Cycle	50%±10%	50%±5%	50%±5%
Current Consumption	50MHz : 62mA typ. 250MHz : 72mA typ.	50MHz : 65mA typ. 250MHz : 75mA typ.	50MHz : 70mA typ. 250MHz : 80mA typ.
Current with Output Disabled	61mA typ.	62mA typ.	63mA typ.
Start-up Time	5 msec. typ. 10 msec. max.	5 msec. typ. 10 msec. max.	5 msec. typ. 10 msec. max.
Phase Jitter, rms (12 KHz to 20 MHz)	350 fs typ. , 500 fs max.	200 fs typ. , 500 fs max.	170 fs typ. , 500 fs max.



Frequency Stability Codes	Frequency stability over operating temp. range	± 25 ppm	± 50 ppm	± 100 ppm	if non-standard, please enter the desired stability after the "C" or "I" for example: "C20" ± 20ppm over -10 to +70°C
	Commercial (-10 to +70°C)	A	B	C	
	Industrial (-40 to +85°C)	D	E	F	
Aging at Ta = 25°C	+3ppm max. first year ; ±2ppm max. per year thereafter				
Output Enable Function on Pad 1 or Pad 2					
OE Control	0.8% of V _{DD} minimum to enable output.				
	0.2% of V _{DD} maximum to disable output .				
Output Enable Time	2.5 ms max.				
Output Disable Time	10 us max.				

Product Related Information

Green Requirement	RoHS compliant, Pb (lead) free in accordance with EU Directive 2002/95/EC 6/6 (2002/95/EC) and WEEE (2002/96/EC). Free of halide, cadmium, hexavalent chromium, lead, mercury, PBB's and PBDE's.
Storage temp. range	-55 to +150°C
Humidity	85% RH, 85°C, 48 hours
Fine Leak / Gross Leak	MIL-Std-883, method 1014, condition A / MIL-Std-883, method 1014, condition C
Solderability	MIL-STD-202F method 208E
Reflow	260°C for 10 sec. Two times.
Vibration	MIL-STD-202F method 204, 35G, 50 to 2000 Hz
Shock	MIL-STD-202F method 213B, test condi. E, 1000GG ½ sine wave
Resistance to Solvent	MIL-STD-202, method 215
Temperature Cycling	MIL-STD-883, method 1010
ESD Rating	Human body model (HBM): 2000 V min.
Pad Surface Finish	Gold (0.3 um to 1.0 um) over nickel (1.27 um to 8.89 um)

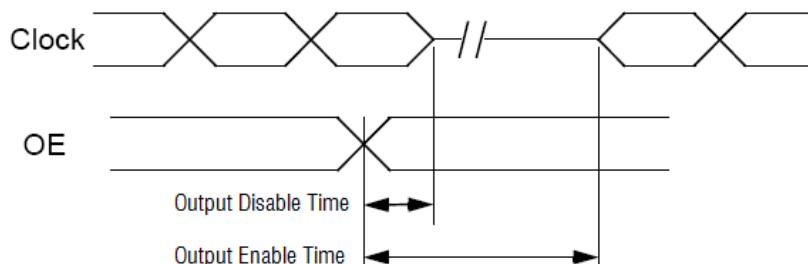
Part Number Format and Example:

Example: 3HTJF5381-E-200.000

3	H	T	JF538	1	-	E	-	200.000
Supply Voltage Code "3" for 3.3V "25" for 2.5V "18" for 1.8V	"H": for clock oscillator	Output Logic Code "T" : CMOS	"JF": Product Series. "538": Package size 5.0x3.2x1.4 mm 8 Pad	OE function. "1": OE on pad1. Note 1		Frequency Stability Code: "A"~"F". See table above.		Frequency (MHz)

Note 1: OE on pad 2 and pad 1 no connection is also available. Please change product series from "JF5381" to "JF5382".

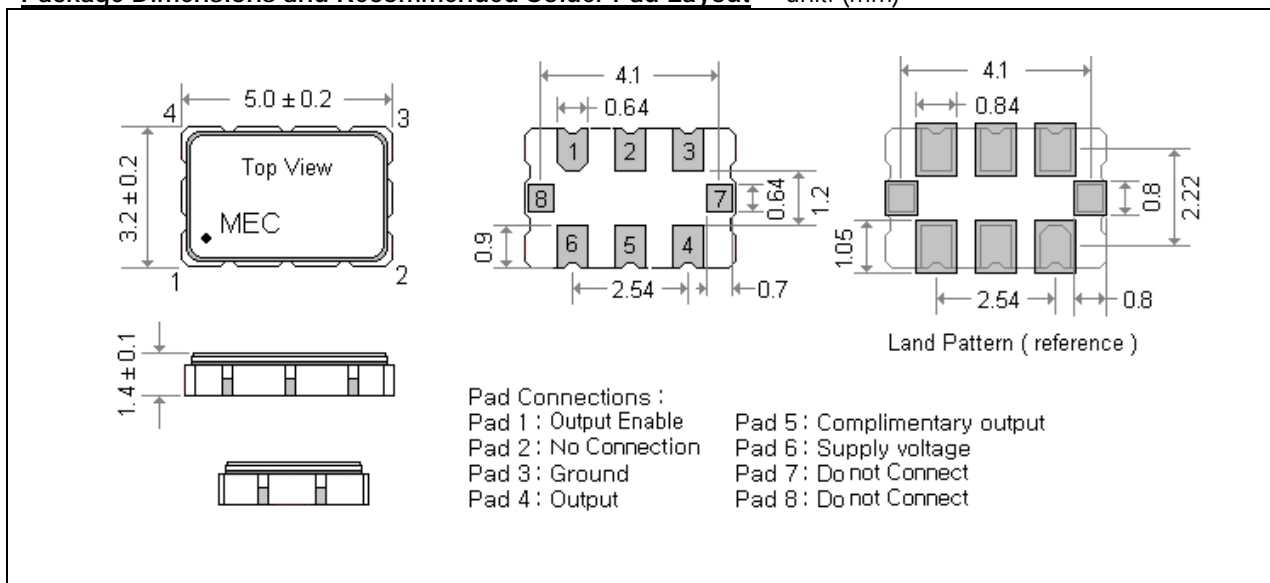
Output OE Function



HTJF538 Phase Noise Plot and Phase Jitter Data (typical), $V_{DD}=+3.3V$

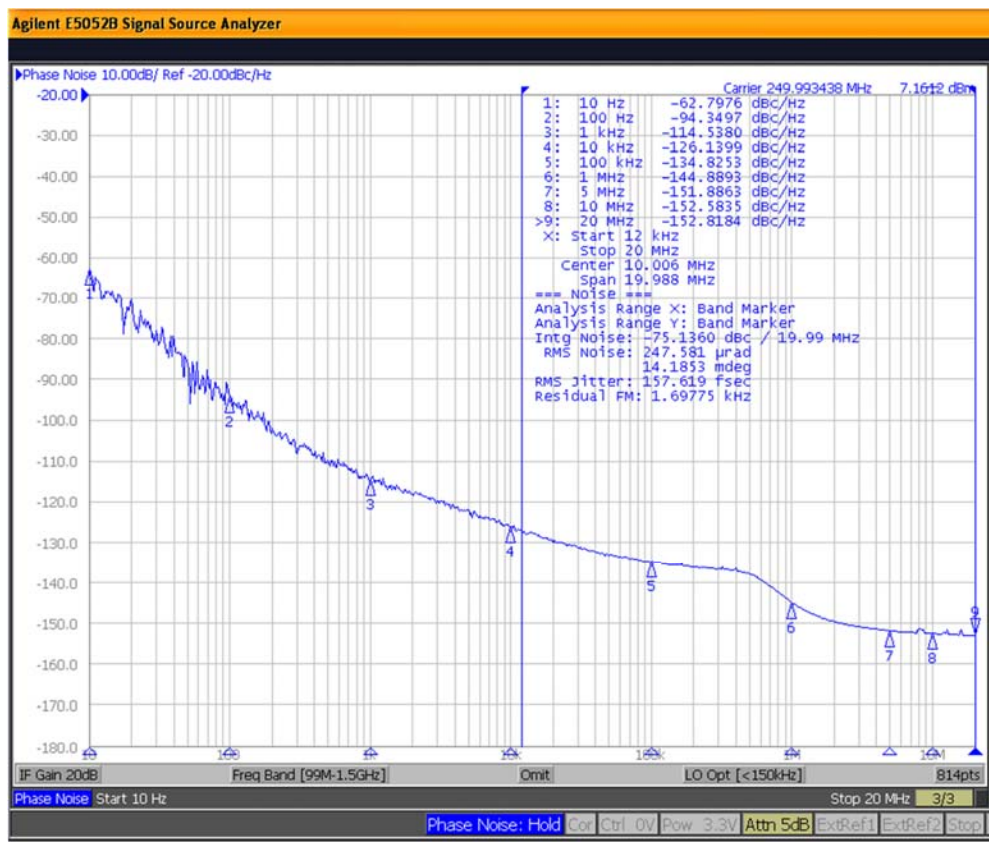
SSB Phase Noise Data (dBc/Hz Typical)	Frequency (MHz)	150	200	250
	100 Hz offset	-98	-94	-94
	1 KHz offset	-118	-115	-114
	10 KHz offset	-131	-127	-126
	100 KHz offset	-138	-136	-134
	1 MHz offset	-148	-146	-144
	5 MHz offset	-155	-153	-151
	10 MHz offset	-156	-153	-152
	20 MHz offset	-156	-154	-152
Phase Jitter fsec (12KHz ~ 20 MHz, RMS)		176	167	157

Package Dimensions and Recommended Solder Pad Layout unit: (mm)



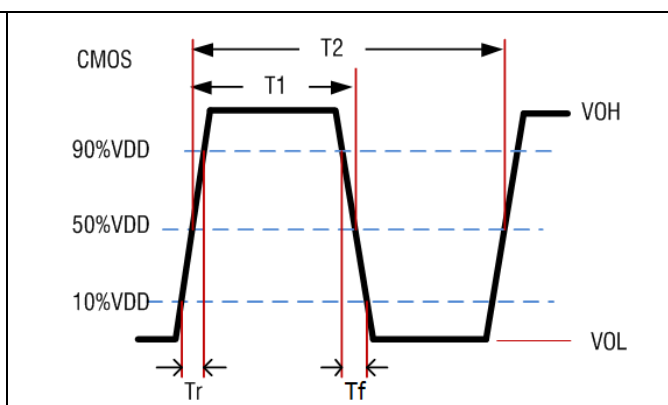
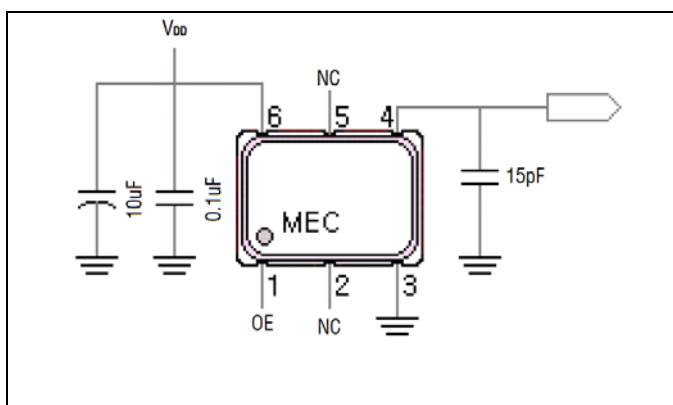


Phase Noise Plot of 3HTJF5381-E-250.000 MHz (XO), VDD=+3.3V



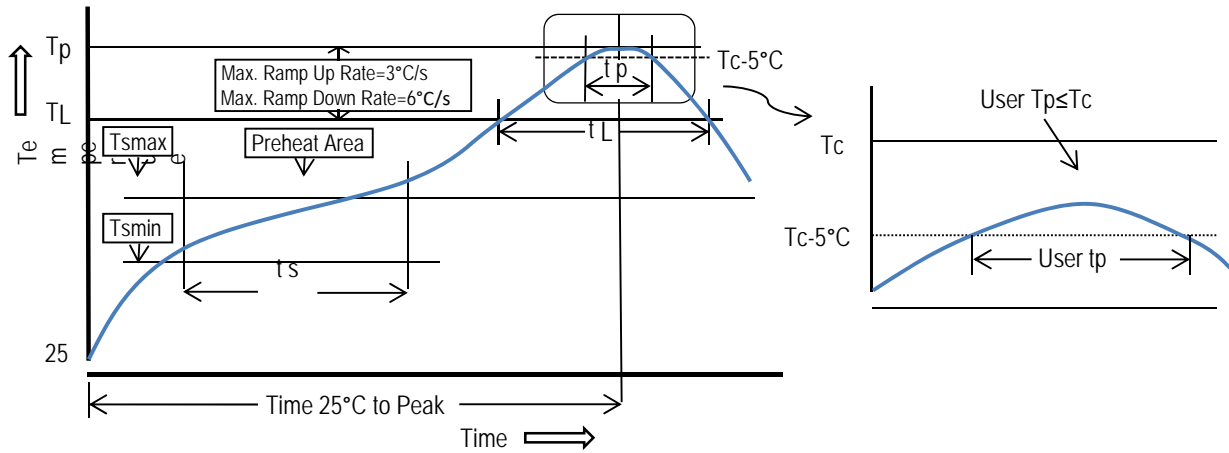
Test Circuits and Output Waveforms

$$\text{Duty cycle} = \left(\frac{T1}{T2}\right) * 100\%$$





Recommended Solder Reflow Profile (per IPC/JEDEC J-STD-020D.1)



Profile Feature	Sn-Pb Eutectic Assembly	Pb-free Assembly
Preheat/Soak		
- Temperature min. (Ts min.)	100°C	150°C
- Temperature max. (Ts max.)	150°C	200°C
- Time (ts) (Ts min. to Ts max.)	60 to 120 seconds	60 to 180 seconds
Ramp-up rate (TL to Tp)	3°C / sec. max.	3°C / sec. max.
Liquidous temperature (TL)	183°C	217°C
Time (tL) maintained above TL	60 to 150 seconds	60 to 150 seconds
Peak package body temperature (Tp)	235°C	260°C
Time (Tp) within 5°C of the classification temperature Tc	10 to 30 seconds	20 to 40 seconds
Ramp-down rate (Tp to TL)	6°C / second max.	6°C / second max.
Time 25°C to peak temperature	6 minutes max.	8 minutes max.

All temperatures refer to topside of the package, measured on the package body surface.