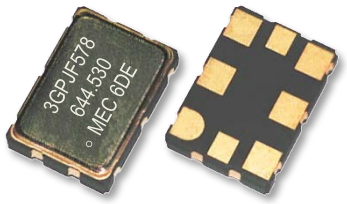
JF-series High Frequency Ultra-low jitter Voltage Contro Oscillators

LVPECL/LVDS/CML Differential Outputs : 50 ~ 2100 MHz.
HCSL Differential Outputs : 50 ~ 700 MHz.
RMS Jitter 150 fsec typical

MERCURY Since 1973

G_JF578, a member of Mercury QuikXO quick-turn Voltage Control oscillators, features LVPECL, LVDS, CML or HCSL output logics and fento second (fs) RMS phase jitter (151 fsec for LVPECL at 644.530 MHz).



General Specifications(*): at Ta=+25°C, C_L=15 pF

Output Logic Type	LVPECL	LVDS	CML	HCSL
Frequency Range	50 ~ 2100 MHz	50 ~ 2100 MHz	50 ~ 2100 MHz	50 ~ 700 MHz
Load	50 ohms into V_{DD}-2V or Thevenin equivalent	100 ohms between OUT and OUTN	50 ohms to V_{DD}	50 ohms to GND
Power Supply Voltage (V_{DD})	+2.5V ± 10% +3.3V ± 10%	+1.8V ± 5% +2.5V ± 10% +3.3V ± 10%	+1.8V ± 5% +2.5V ± 10% +3.3V ± 10%	+1.8V ± 5% +2.5V ± 10% +3.3V ± 10%
Output "High" Voltage; V_{OH}	V_{DD} - 1.165V min. V_{DD} - 0.8V max.	V_{DD} : 1.4 V typical V_{DD} : 1.6 V max.	V_{DD} – 0.085V min V_{DD} = max.	V_{DD} : 0.66V min. V_{DD} : 1.15V max.
Output "Low" Voltage; V_{OL}	V_{DD} – 2.0V min. V_{DD} - 1.55V max	V_{DD} : 1.1 V typical V_{DD} : 0.9 V min.	V_{DD} - 0.6V min. V_{DD} - 0.32V min.	V_{DD} : 0.0V min. V_{DD} : 0.15V 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			
Duty Cycle (at 50% V_{DD})	50% ±5%	50% ±5%	50% ±5%	50% ±5%
Rise Time (Tr) / Fall Time (Tf) (20% ↔ 80% waveform)	0.35 nS. max.	0.35 nS. max.	0.35 nS. max.	0.4 nS. max.
Current Consumption at V_{DD} = 3.3V	100mA typ. 120mA max.	75mA typ. 90mA max.	70mA typ. 85mA max.	94mA typ. 115mA max.
Current with Output Disabled	99mA typ.	74mA typ.	69mA typ.	93mA typ.

MERCURY www.mercury-crystal.com
Taiwan: TEL (886)-2-2406-2779, FAX (886)-2-2496-0769, e-mail: sales-tw@mercury-crystal.com
U.S.A.: TEL (1)-909-466-0427, FAX (1)-909-466-0762, e-mail: sales-us@mercury-crystal.com

Start-up Time	5ms typical ; 10 ms max.		
Phase Jitter, rms (12 KHz to 20 MHz)	150 fsec typical , 300 fsec Max.		
Output Enable Function on Pad 2			
OE Control	0.8% of V_{DD} minimum or no connection to enable output.		
	0.2% of V_{DD} maximum to disable output (high impedance).		
Output Enable Time	2.5 ms max.		
Output Disable Time	10 us max.		
Control Voltage Function on Pad 1			
Control Voltage Center	+0.9 V for V_{DD}=1.8 V	+1.25 V for V_{DD}=2.5 V	+1.65 V for V_{DD}=3.3 V
Control Voltage Range	+0.18 V ~ +1.62 V	+0.25 V ~ +2.25 V	+0.3 V ~ +3.0 V
Frequency Pulling Range	±50 ppm min. ; ± 250 ppm max.		
Linearity	±1% typical. ±10% max.		
Transfer Function	Positive Transfer		
Absolute Voltage	3.8 V max.		
Input Impedance	5 MΩ min.		
Bandwidth	10KHz typ. Measured at -3 dB		
Harmonics	-5.0 dBc max		

(*)If you want detailed specifications, please call for details.

Environmental Performance Specifications

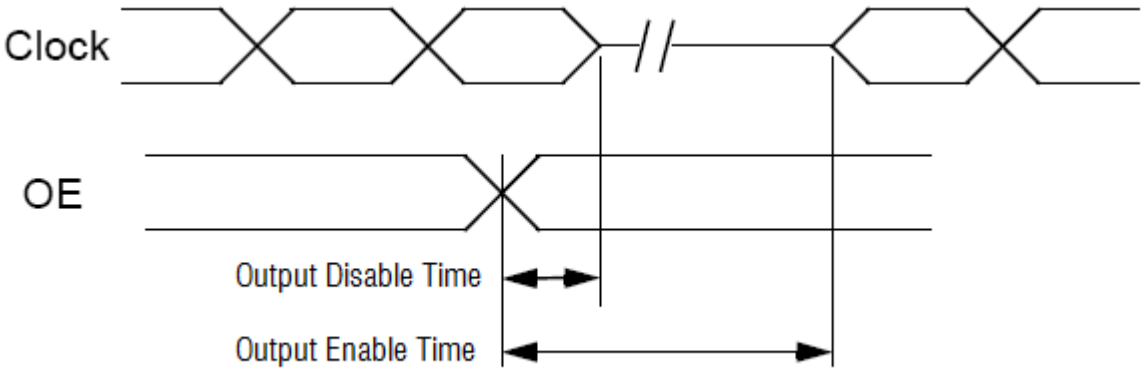
Green Requirement	RoHS compliant, Pb (lead) free in accordance with EU Directive 2002/95/EC 6/6 (2002/95/EC) and WEEE (2002/96/EC). Free of halide, cadmium, hexavalent chromium, lead, mercury, PBB's and PBDE's.
Second Level Interconnect	e4
Storage temp. range	-55 to +150°C
Humidity	85% RH, 85°C, 48 hours
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)
Weight of the Device	0.045 grams typical

Part Number Format and Example:

Example: 3GPJF578-E-150N-644.530

3	G	P	JF578	-	E	-	150N	-	644.530
Supply Voltage code "3" for 3.3V "25" for 2.5V "18" for 1.8V	"G" : for Voltage Control oscillators	Output Logic Code "P" : PECL "L" : LVDS "C" : HCSL "Q" : CML	"JF": Product Series. "578": Package size 5.0x7.0x1.8 mm 8 Pad		Operating Temp. Range Code		Pulling Range Code "M" stands for maximum "N" stands for minimum "T" stands for typical		Frequency (MHz)

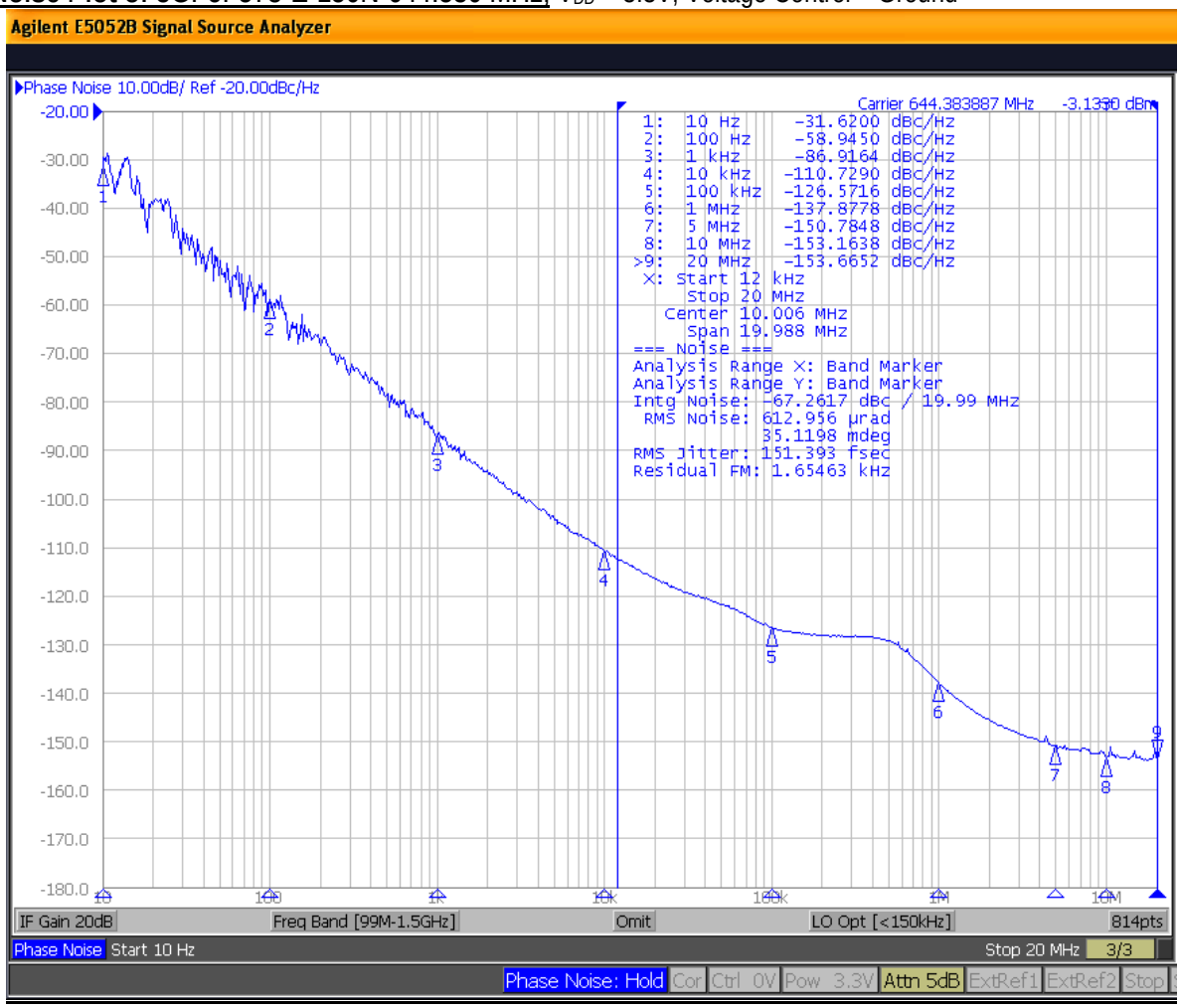
Output OE Function on Pad2



3GPJF578 Phase Noise and Phase Jitter Data (typical), V_{DD}=+3.3V, Voltage Control = Ground

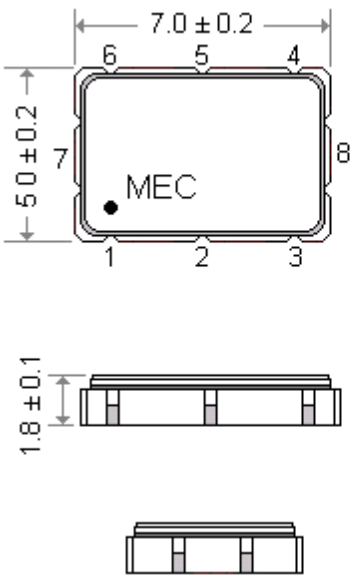
SSB Phase Noise Data (dBc/Hz Typical)	Frequency (MHz)	156.250	491.52	644.530	1480	2100
	10 Hz offset	-39	-16	-31	-12	-18
	100 Hz offset	-74	-48	-58	-54	-49
	1 KHz offset	-99	-83	-86	-80	-77
	10 KHz offset	-123	-112	-110	-104	-100
	100 KHz offset	-139	-128	-126	-119	-116
	1 MHz offset	-149	-140	-137	-130	-125
	5 MHz offset	-156	-151	-150	-145	-141
	10 MHz offset	-157	-153	-153	-148	-145
	20 MHz offset	-157	-154	-153	-150	-147
Phase Jitter fsec (12KHz ~ 20 MHz, RMS)		159	155	151	147	163

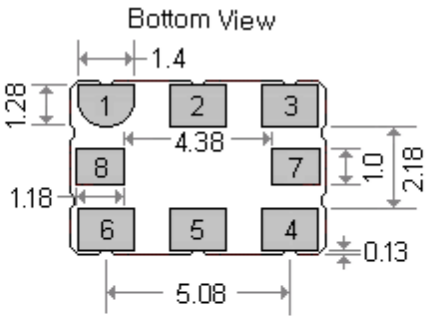
Phase Noise Plot of 3GPJF578-E-150N-644.530 MHz, V_{DD}=+3.3V, Voltage Control = Ground

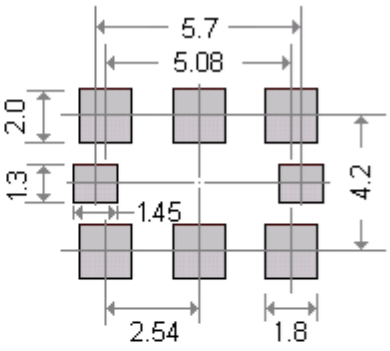


Package Dimensions and Recommended Solder Pad Layout unit: (mm)

G_JF578 Package unit: mm





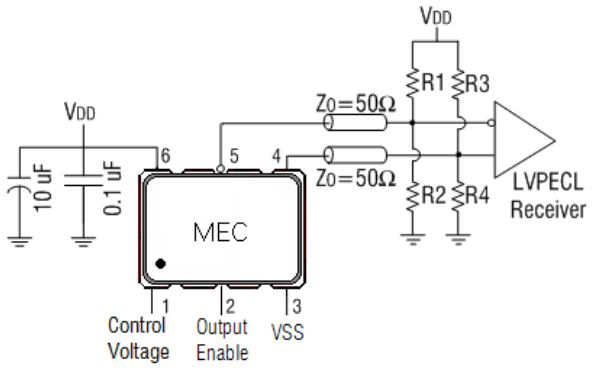


Pad Connections :
Pad 1 : Control Voltage
Pad 2 : OE
Pad 3 : Ground
Pad 4 : Output
Pad 5 : Complimentary output
Pad 6 : Supply voltage
Pad 7 : No connection
Pad 8 : No connection

Test Circuits and Output Waveforms

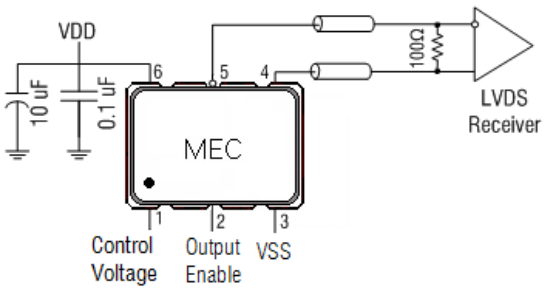
Duty cycle=$\left(\frac{T1}{T2}\right) * 100\%$. Measured at 50% V_{DD}

LVPECL

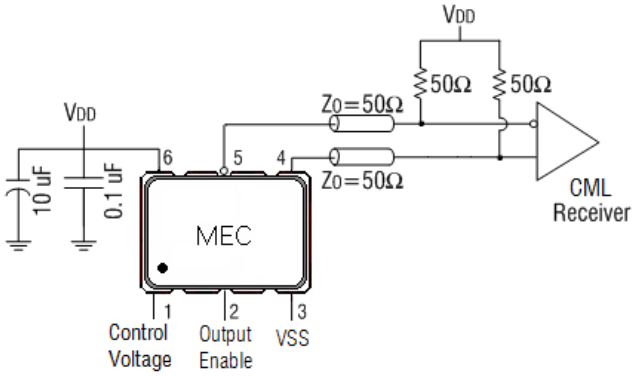


VDD=3.3V: R1=R3=127Ω; R2=R4=82.5Ω
VDD=2.5V: R1=R3=250Ω; R2=R4=62.5Ω

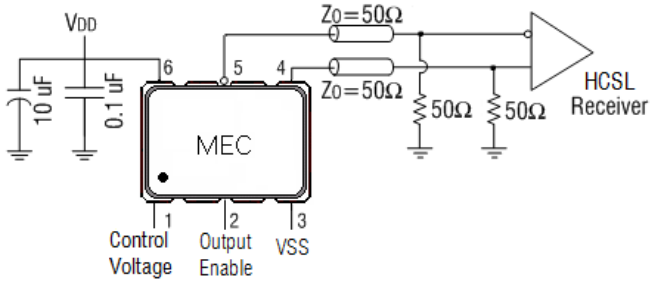
LVDS



CML

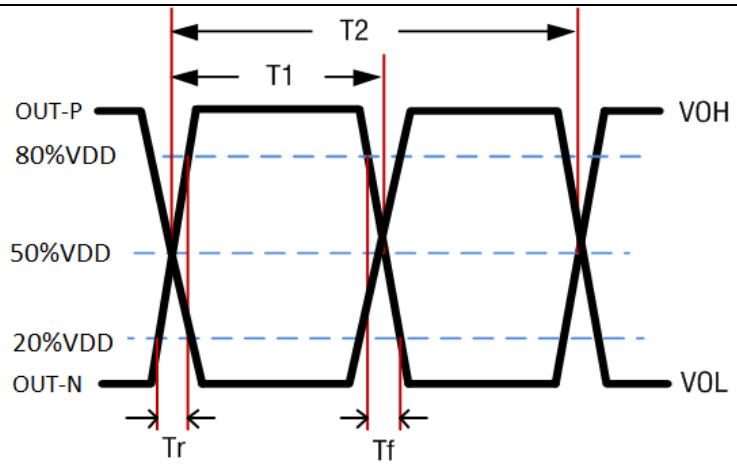


HCSL

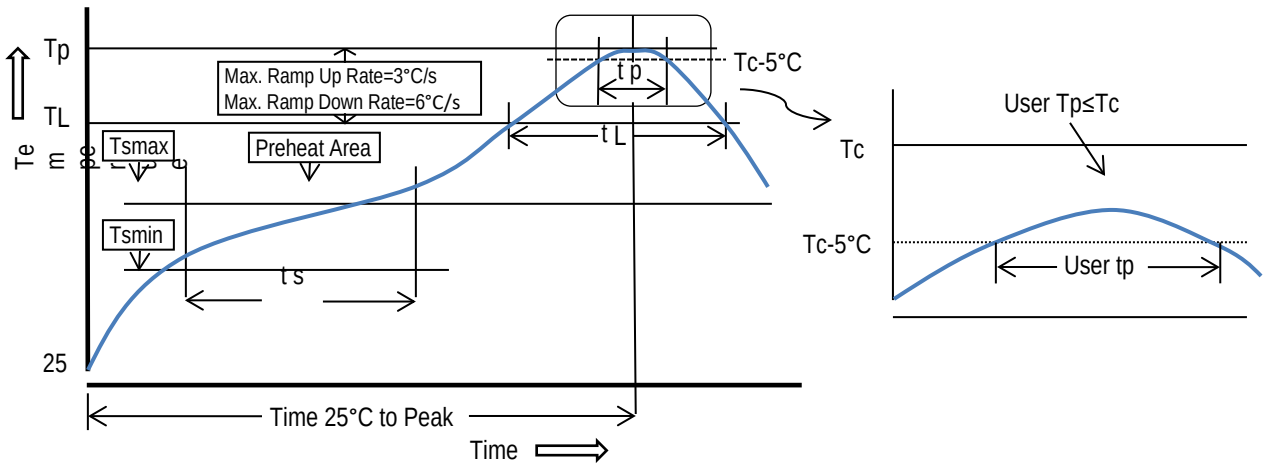


Differential Output Waveforms

Duty cycle=$\left(\frac{T1}{T2}\right) * 100\%$. Measured at 50% V_{DD}



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.) - Temperature max. (Ts max.) - Time (ts) (Ts min. to Ts max.)	 100ºC 150ºC 60 to 120 seconds	 150ºC 200ºC 60 to 180 seconds
Ramp-up rate (T_L to Tp)	3ºC / sec. max.	3ºC / sec. max.
Liquidous temperature (T_L) Time (t_L) maintained above T_L	183ºC 60 to 150 seconds	217ºC 60 to 150 seconds
Peak package body temperature (Tp)	235ºC	260ºC
Time (Tp) within 5ºC of the classification temperature Tc	10 to 30 seconds	20 to 40 seconds
Ramp-down rate (Tp to T_L)	6ºC / second max.	6ºC / second max.
Time 25ºC to peak temperature	6 minutes max.	8 minutes max.

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