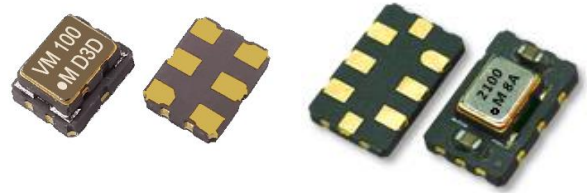


Temperature Compensated Crystal Oscillators [TCXO " M " and VCTCXO " VM "]

TCXO	VCTCXO	Quick - Turn Clock Oscillators	250 fsec RMS Jitter	SMD	1.8 V	2.5 V	3.3 V	Min. 15 MHz	Max. 2,100 MHz
MJF_	VMJF_								

Features

- Wide frequency range : 15 ~ 2100 MHz
- RMS jitter (12KHz ~ 20MHz) : 250 fsec typ. (at 156.250MHz , 3.3V)
- Next-Day sample for Prototypes
- package size : 5.0 x 3.2mm and 3.2 x 2.5mm



General specifications , at Ta = + 25°C

Model	(V)MJF326P , (V)MJF538P	(V)MJF326D , (V)MJF538D	(V)MJF326C , (V)MJF538C	(V)MJF326Q , (V)MJF538Q
Output Logic	LVPECL	LVDS	HCSL	CML
Supply Voltage V _{DD}	--	+ 1.8 V ± 5% (*)	+ 1.8 V ± 5%	+ 1.8 V ± 5%
	+ 2.5 V ± 5%	+ 2.5 V ± 5%	+ 2.5 V ± 5%	+ 2.5 V ± 5%
	+ 3.3 V ± 5%	+ 3.3 V ± 5%	+ 3.3 V ± 5%	+ 3.3 V ± 5%
Available Frequency Range	15 ~ 2,100 MHz	15 ~ 2,100 MHz	15 ~ 700 MHz	15 ~ 2,100 MHz
Output Load	50 Ω into V _{DD} - 2V or Thevenin equivalent	100 Ω between output and complimentary output	50 Ω to GND	50 Ω to V _{DD}
Output Logic " High " , " 1 "	V _{DD} - 1.03 V (min.) V _{DD} - 0.6 V (max.)	1.4 V (Typ.) 1.6 V (max.)	V _{DD} : 0.66 V (min.) V _{DD} : 1.15 V (max.)	V _{DD} - 0.085 V (min.) V _{DD} = (max.)
Output Logic " Low " , " 0 "	V _{DD} - 1.85 V (min.) V _{DD} - 1.6 V (max.)	1.1 V (Typ.) 0.9 V (min.)	V _{DD} : - 0.15 V (min.) V _{DD} : 0.15 V (max.)	V _{DD} - 0.6 V (min.) V _{DD} - 0.32 V (max.)
Output Voltage Swing	595 mV (min.) 930 mV (max.)	250 mV (min.) 450 mV (max.)	620 mV (min.) 700 mV (typ.)	200 mV (min.) 600 mV (max.)
Current Consumption (V _{DD} = + 3.3 V)	100 mA (typ.) 120 mA (max.)	75 mA (typ.) 90 mA (max.)	80 mA (typ.) 100 mA (max.)	70 mA (typ.) 85 mA (max.)
Current with Output Disabie	99 mA (typ.)	74 mA (typ.)	79 mA (typ.)	69 mA (typ.)
Rise Time / Fall Time (20% to 80% Waveform)	0.4 nsec. (max.)	0.4 nsec. (max.)	0.4 nsec. (max.)	0.4 nsec. (max.)
Initial Calibration Tolerance	± 1.0 ppm (max.) at +25°C ± 2°C			
Frequency Stability	Temperature (ref to +25°C)	± 1.5 ppm over -40°C to +85°C (default)		
		± 1.0 ppm over -40°C to +85°C (available)		
	Aging at Ta = +25°C	± 1.0 ppm (max.) , per year		
	Voltage Change	± 0.2 ppm (max.) , for a ± 5% input voltage change.		
	Load Change	± 0.2 ppm (max.) , for a ± 10% load condition change.		
	Reflow	± 1.0 ppm (max.) , 1 reflow and measured 24 hours afterwards.		
Duty Cycle	50 % ± 5%			
Start-up Time	5 msec (typ.) ; 10 msec (max.)			
Storage Temperature	-55°C to +150°C			
RMS Jitter (typ.) (12 KHz to 20 MHz)	15 MHz ~ 50 MHz : 500 fsec (typ.) , 51 MHz ~ 1,200 MHz : 250 fsec (typ.)			
Control Voltage Function on Pad 1		Output Enable Function on pad 2		
Control Voltage Center and Range	+ 1.5V ± 1.0V for both V _{DD} = 2.5V and 3.3V	Output Enable / Disable Function	70% of V _{DD} (min.) to enable output.	
	+ 0.9V ± 0.6V for both V _{DD} = 1.8V		30% of V _{DD} (max.) to disable output	
Frequency Pulling Range	± 8 ppm (min.)	Output Enable Time	2.5 msec (max.)	
Linearity	1% (typ.) ; 10% (max.)			
Transfer Function	Positive Transfer	Output Disable Time	10 usec (max.)	
Input Impedance	5 MΩ (typ.)			

Note * : This needs AC coupling (100-nF series capacitor). Please check the test circuit.

Temperature Compensated Crystal Oscillators [TCXO " M " and VCTCXO " VM "]

TCXO	VCTCXO								
MJF_	VMJF_	Quick - Turn Clock Oscillators	250 fsec RMS Jitter	SMD	1.8 V	2.5 V	3.3 V	Min. 15 MHz	Max. 2,100 MHz

Part Number Format and Example

[1]	[2]	[3]	[4]	-	[5]	-	[6]	/	[7]
Holder Type	Package Code	Waveform Code	Supply Voltage		Center Frequency		Frequency Stability		Operating Temp. Range

Examples	(1)	MJF	326	D	33	-	156.250	-	1.0	/	-20+70
	(2)	VMJF	538	C	18	-	100.000	-	1.5	/	-40+85

Ex (1) : MJF326D33 - 156.250 - 1.0 / -20+70 [TCXO , MJF326 type , LVDS , +3.3V , 156.250MHz , ± 1.0 ppm from -20°C to 70°C]

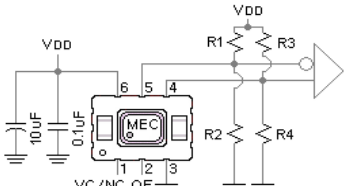
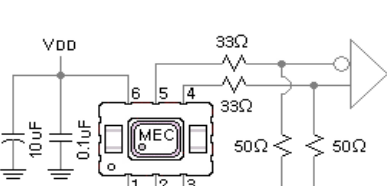
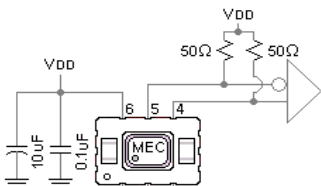
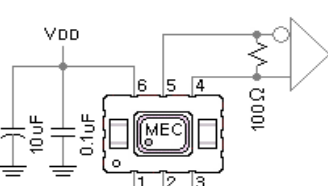
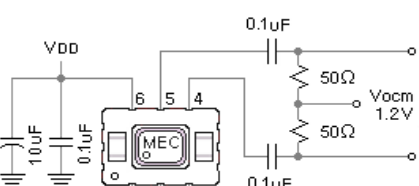
Ex (2) : VMJF538C18 - 100.000 - 1.5 / -40+85 [VCTCXO , VMJF538 type , HCSL , +1.8V , 100.000MHz , pulling : $\pm 8\text{ppm min.}$, $\pm 1.5\text{ppm}$ from -40°C to 85°C]

[1]	Holder Type : " MJF " stands for TCXO ; " VMJF " stands for VCTCXO
[2]	Package Code : " 326 " stands for 3.2 x 2.5 x 1.6 mm 6pad ; " 538 " stands for 5.0 x 3.2 x 1.4 mm 8pad
[3]	Output Waveform Code : " P " stands for LVPECL ; " D " stands for LVDS ; " C " stands for HCSL ; " Q " stands for CML
[4]	Supply Voltage : " 18 " stands for +1.8V ; " 25 " stands for +2.5V ; " 33 " stands for +3.3V
[5]	Center Frequency in MHz
[6]	Frequency Stability in $\pm$ ppm ; ex 1 : ± 1.0 ppm --- 1.0 , ex 2 : ± 1.5 ppm --- 1.5
[7]	Operating Temperature Range in $^{\circ}\text{C}$ ex 1 : -20°C to 70°C ----- -20+70 ; ex 2 : -40°C to 85°C ----- -40+85

Outline Dimensions (Unit : mm) , Suggested pad Layout for SMDs

MJF538_ , VMJF538_			MJF326_ , VMJF326_		
Top View	Bottom View	Land Pattern	Top View	Bottom View	Land Pattern
Side View	Pad Connection : Pad 1 : Ground for TCXO VC for VCTCXO Pad 2 : Output Enable Pad 3 : Ground Pad 4 : Output Pad 5 : Complementary Pad 6 : Supply voltage Pad 7 : Do Not Connet Pad 8 : Do Not Connet		Side View	Pad Connection : Pad 1 : Ground for TCXO VC for VCTCXO Pad 2 : Output Enable Pad 3 : Ground Pad 4 : Output Pad 5 : Complementary Pad 6 : Supply voltage	

Test Circuits

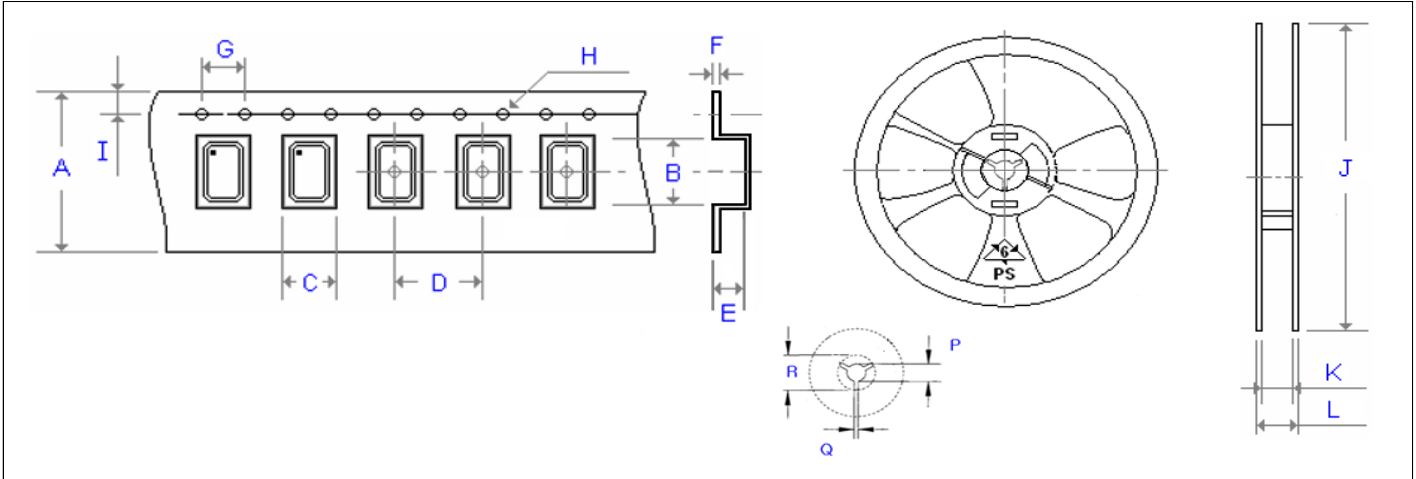
LVPECL Test Circuit		HCSL Test Circuit	
 VDD = 3.3 V : R1 = R3 = 127 Ω ; R2 = R4 = 82.5 Ω VDD = 2.5 V : R1 = R3 = 250 Ω ; R2 = R4 = 62.5 Ω			
CML Test Circuit	LVDS Test Circuit for 2.5V and 3.3V	LVDS Test Circuits for 1.8V only (*)	
			

Note * : The 50-ohm termination resistors along with the bias voltage (Vocm) is required to be set at the destination circuit as shown in the figure.

Emboss Taping and Reel Specifications

[VCXO]

[(VC)TCXO]



Carrier Type Dimensions (unit : mm) ±0.3mm

	A	B	C	D	E	F	G	H	I	pcs / reel
G_226	8.00	2.80	2.25	4.00	1.10	0.30	4.00	Ø 1.50	1.75	3000
G_326	8.00	3.40	2.70	4.00	1.40	0.25	4.00	Ø 1.50	1.75	3000
G_536	12.00	5.30	3.60	8.00	1.40	0.30	4.00	Ø 1.50	1.75	1000
G_576	16.00	7.30	5.30	8.00	1.90	0.30	4.00	Ø 1.50	1.75	1000
G_538	12.00	5.40	3.60	8.00	1.70	0.30	4.00	Ø 1.50	1.75	1000
G_578	16.00	7.30	5.30	8.00	1.90	0.30	4.00	Ø 1.50	1.75	1000
(V)M21	8.00	2.30	1.90	4.00	0.90	0.25	4.00	Ø 1.50	1.75	3000
ME21	8.00	2.30	1.50	4.00	1.35	0.25	4.00	Ø 1.50	1.75	3000
(V)M22	8.00	2.80	2.25	4.00	1.10	0.30	4.00	Ø 1.50	1.75	3000
(V)M_32	8.00	3.71	2.80	4.00	1.75	0.25	4.00	Ø 1.50	1.75	3000
(V)M_326	12.00	3.60	2.90	4.00	1.70	0.30	4.00	Ø 1.50	1.75	1000
(V)M_53	12.00	5.30	3.60	8.00	1.40	0.30	4.00	Ø 1.50	1.75	1000
(V)M_538	12.00	5.40	3.60	8.00	1.70	0.30	4.00	Ø 1.50	1.75	1000
(V)M_57(2)	16.00	7.40	5.50	8.00	2.80	0.35	4.00	Ø 1.50	1.75	500
(V)M_43 (63)	24.00	11.80	10.00	16.00	5.00	0.30	4.00	Ø 1.50	1.75	500

Reel Dimensions (unit : mm) +2.0 / -0.0mm

	J	K	L	P	Q	R	pcs / reel
G_226	180.00	9.00	12.00	13.20	2.10	-	3000
G_326	180.00	9.00	12.00	13.20	2.10	-	3000
G_536	180.00	13.00	16.00	13.20	2.50	-	1000
G_576	180.00	17.20	19.30	13.30	2.20	22.00	1000
G_538	180.00	13.00	16.00	13.20	2.50	-	1000
G_578	180.00	17.20	19.30	13.30	2.20	22.00	1000
(V)M21	180.00	9.00	12.00	13.20	2.10	-	3000
ME21	180.00	9.00	12.00	13.20	2.10	-	3000
(V)M22	180.00	9.00	12.00	13.20	2.10	-	3000
(V)M_32	180.00	9.00	12.00	13.20	2.10	-	3000
(V)M_326	180.00	13.00	16.00	13.20	2.50	-	1000
(V)M_53	180.00	13.00	16.00	13.20	2.50	-	1000
(V)M_538	180.00	13.00	16.00	13.20	2.50	-	1000
(V)M_57(2)	180.00	17.20	19.30	13.30	2.20	22.00	500
(V)M_43 (63)	330.00	24.50	29.10	13.00	2.20	17.30	500