

SANYO

LC75821E, 75821W

LCD Display Drivers

Overview

The LC75821E and LC75821W are general-purpose LCD display drivers that can be used for frequency display in microprocessor-controlled radio receivers and in other display applications.

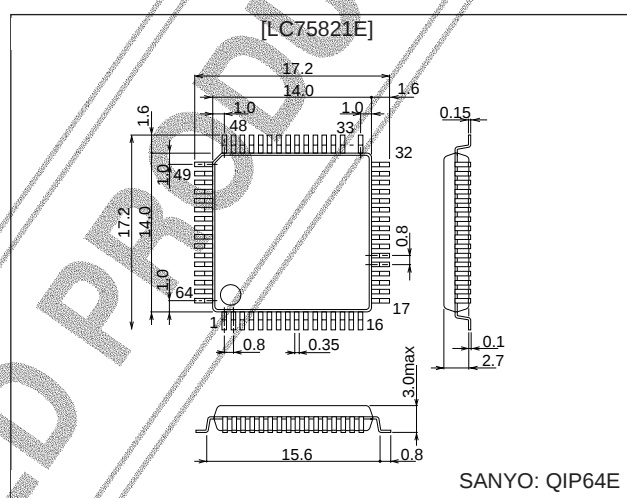
Features

- 53 segment outputs (the maximum for static drive)
- Two drive types: static (1/1) duty (53 segments) and 1/2 duty (104 segments)
- Data input: 3 serial input pins
- INH pin for turning off all display output
- The difference from the LC7582: The LC75821E, LC75821W are A/D converter, DSP function-removed versions of the LC7582 of which the functions other than the two can be used with pin compatibility with the LC7582 kept.

Package Dimensions

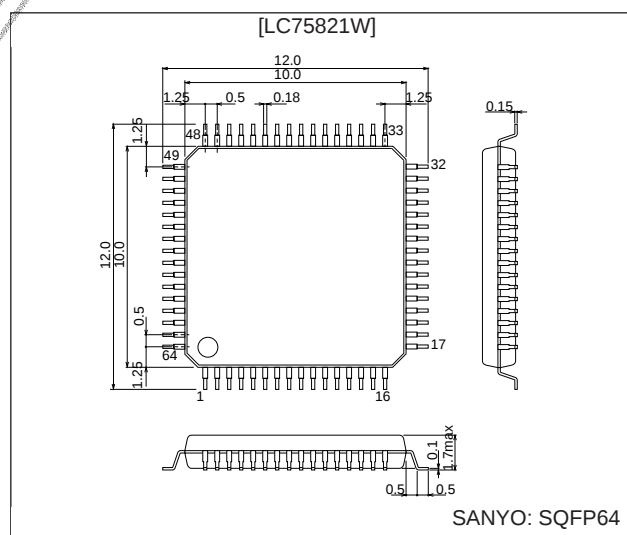
unit: mm

3159-QFP64E



unit: mm

3190-SQFP64



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Specifications

Absolute Maximum Ratings at Ta = 25°C, V_{SS} = 0 V

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V _{DD max}	V _{DD}	–0.3 to +7.0	V
	V _{LCD}	V _{LCD}	–0.3 to V _{DD} + 0.3	V
Input voltage	V _{IN1}	CE, CLK, DATA, $\overline{\text{INH}}$	–0.3 to +7.0	V
	V _{IN2}	OSC: output off	–0.3 to V _{DD} + 0.3	V
Output voltage	V _{OUT}	OSC: output off	–0.3 to V _{DD} + 0.3	V
Output current	I _{OUT1}	S1 to S53	100	μA
	I _{OUT2}	COM1, COM2	1.0	mA
Allowable power dissipation	Pd max	Ta = 85°C	100	mW
Operating temperature	Topr		–40 to +85	°C
Storage temperature	Tstg		–55 to +125	°C

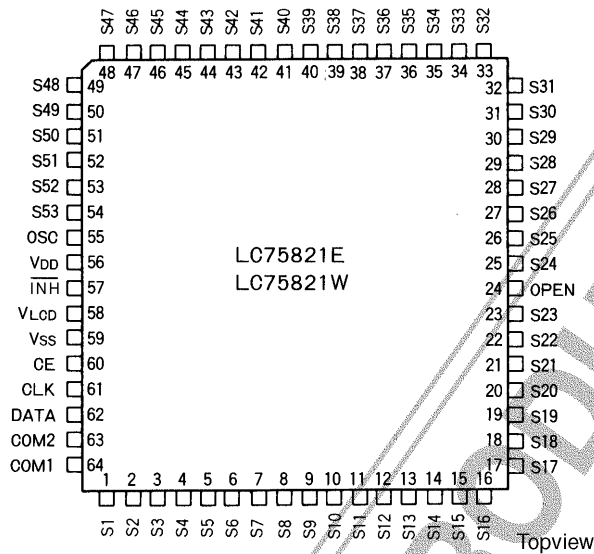
Allowable Operating Ranges at Ta = –40 to +85°C, V_{SS} = 0 V

Parameter	Symbol	Conditions	min	typ	max	Unit
Supply voltage	V _{DD}	V _{DD}	3.0		6.5	V
	V _{LCD}	V _{LCD}	3.0		V _{DD}	V
Input high-level voltage	V _{IH1}	$\overline{\text{INH}}$	0.7 V _{DD}		6.5	V
Input high-level voltage	V _{IH2}	CE, CLK, DATA	0.8 V _{DD}		6.5	V
Input low-level voltage	V _{IL1}	$\overline{\text{INH}}$	0		0.3 V _{DD}	V
Input low-level voltage	V _{IL2}	CE, CLK, DATA	0		0.2 V _{DD}	V
Recommended external resistance	R _{OSC}	OSC		51		kΩ
Recommended external capacitance	C _{OSC}	OSC		680		pF
Guaranteed oscillation range	f _{OSC}	OSC	25	50	100	kHz
Clock low-level pulse width	t _{0L}	CLK	0.25			μs
Clock high-level pulse width	t _{0H}	CLK	0.25			μs
Data setup time	t _{sup}	CLK, DATA	0.25			μs
Data hold time	t _{dh}	CLK, DATA	0.25			μs
Serial data pulse width	t ₁	CE, DATA	1			μs
	t ₂	CE, CLK	1.25			μs
	t ₃				1	μs
	t ₄		4			μs

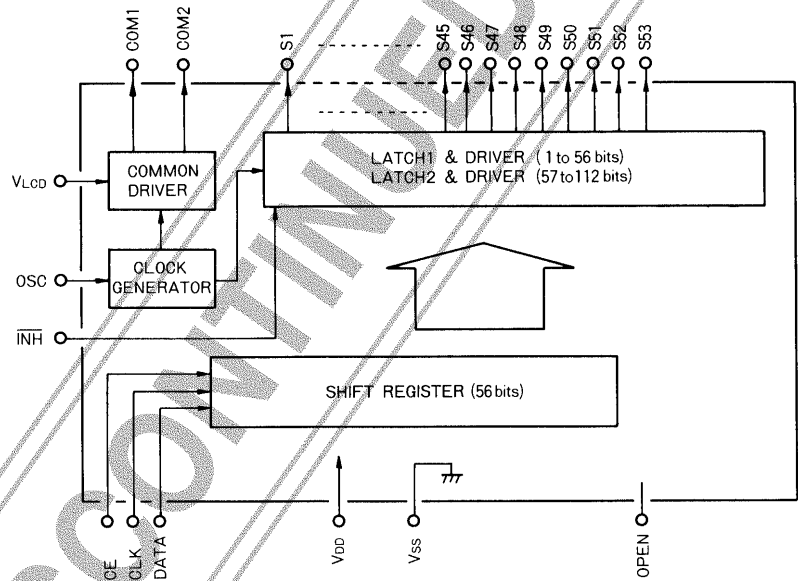
Electrical Characteristics for the Allowable Operating Ranges

Parameter	Symbol	Conditions	min	typ	max	Unit
Input high-level current	I _{IH}	CE, CLK, DATA, $\overline{\text{INH}}$: V _I = 6.5 V			5	μA
Input low-level current	I _{IL}	CE, CLK, DATA, $\overline{\text{INH}}$: V _I = 0 V	–5			μA
Output high-level voltage	V _{OH1}	S1 to S53: I _O = –10 μA	V _{DD} – 1.0			V
Output high-level voltage	V _{OH2}	COM1, COM2: I _O = –100 μA	V _{LCD} – 0.6			V
Output low-level voltage	V _{OL1}	S1 to S53: I _O = 10 μA			1.0	V
Output low-level voltage	V _{OL2}	COM1, COM2: I _O = 100 μA			0.6	V
Mid-level voltage	V _{MID1}	COM1, COM2: V _{LCD} = 6.5 V, I _O = ±100 μA	2.65	3.25	3.85	V
	V _{MID2}	COM1, COM2: V _{LCD} = 3.0 V, I _O = ±100 μA	0.9	1.5	2.1	V
Oscillator frequency	f _{OSC}	OSC: R = 51 kΩ, C = 680 pF	40	50	60	kHz
Hysteresis voltage	V _H	CE, CLK, DATA: V _{DD} = 5 V	0.3			V
Current drain	I _{DD}				0.6	mA
	I _{LCD}	V _{LCD}			2	mA

Pin Assignment



Block Diagram

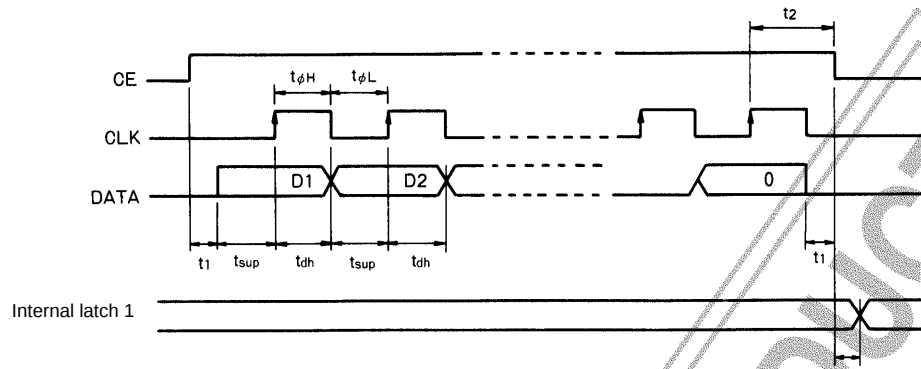


Pin Functions

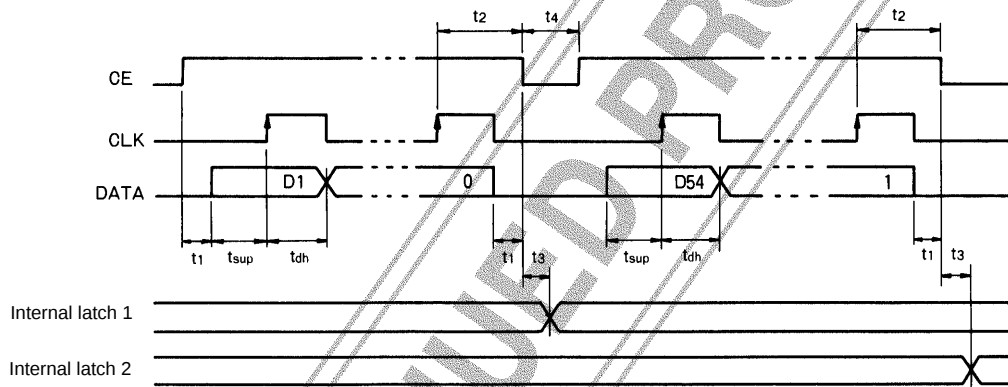
Pin	Function
S1 to S53	Segment output pins
COM1, COM2	Common output pins (Only COM1 is used in static (1/1) drive. COM2 must be left open in that mode.)
V _{LCD}	LCD bias voltage setting
OSC	Oscillator connection
CE, CLK, DATA	Serial data transfer inputs
V _{SS} , V _{DD}	Power supply
INH	Display off control input INH = low (V _{SS})Display off (S1 to S53, COM1, COM2 = low) INH = high (V _{DD})Display on Note that serial data transfers can be performed when display output is forced off.
OPEN	Make no connections to this pin.

Serial Data

1. Static duty (56 bits)

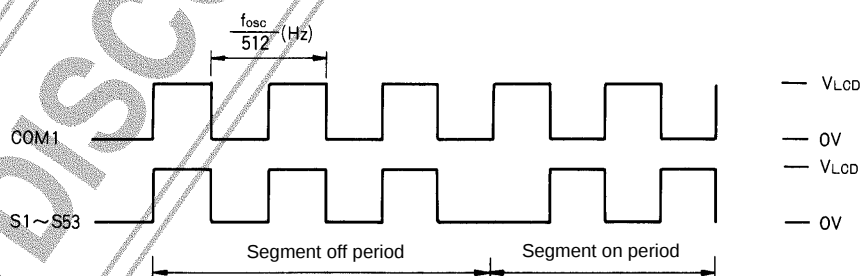


2. 1/2 duty (112 bits)

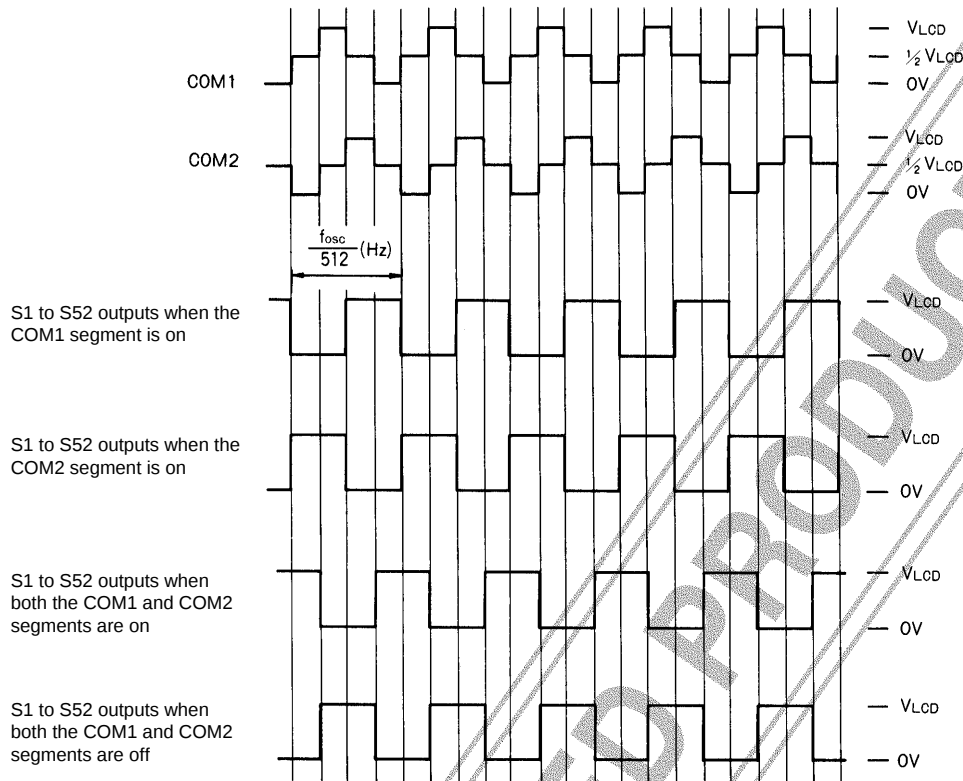


Output Waveforms

1. Static duty



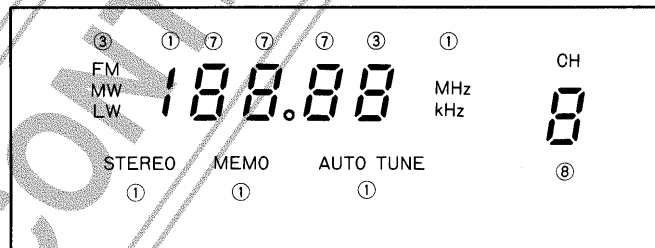
2. 1/2 duty



Display Examples

1. Static drive (1/1 duty)

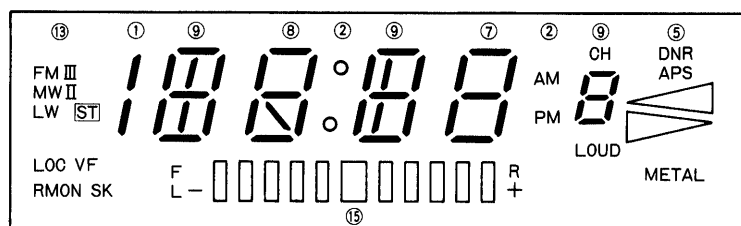
Example with 40 segments (Up to 53 segments can be driven.)



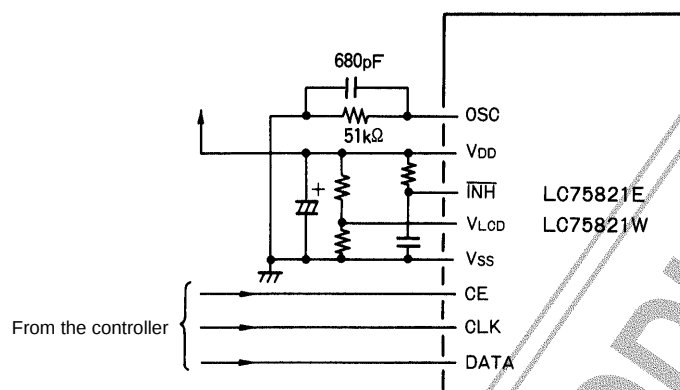
Note: Numbers in circles indicate the number of segments used.

2. 1/2 duty drive

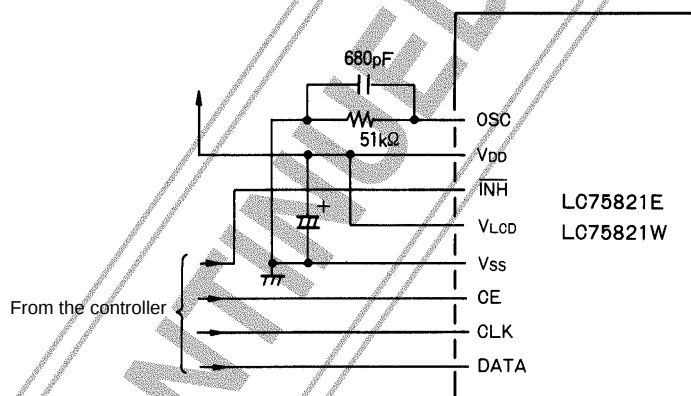
Example with 80 segments (Up to 104 segments can be driven.)



Sample Application Circuit 1



Sample Application Circuit 2



Note: The internal display data is undefined when power (V_{DD}) is first applied. Since a meaningless pattern will be displayed if the display is turned on in that state, the display should be turned off by setting $\overline{\text{INH}}$ low and turned on only after display data has been sent from the controller.

Transfer (external input) Data/Output Pin Correspondence

Output pin	DP	0	1	COM1	COM2
		1/1 duty	1/2 duty		
S1	D1		D1	○	
			D2		○
S2	D2		D3	○	
			D4		○
S3	D3		D5	○	
			D6		○
⋮	⋮	⋮	⋮	⋮	⋮
S26	D26		D51	○	
			D52		○
S27	D27		D54	○	
			D55		○
S28	D28		D56	○	
			D57		○
⋮	⋮	⋮	⋮	⋮	⋮
S43	D43		D86	○	
			D87		○
S44	D44		D88	○	
			D89		○
S45	D45		D90	○	
			D91		○
S46	D46		D92	○	
			D93		○
S47	D47		D94	○	
			D95		○
S48	D48		D96	○	
			D97		○
S49	D49		D98	○	
			D99		○
S50	D50		D100	○	
			D101		○
S51	D51		D102	○	
			D103		○
S52	D52		D104	○	
			D105		○
S53	D53		Always on	○	
			Always on		○

Note: Only COM1 is used in static (1/1 duty) drive.

Oscillator Frequency

Refer to the figure below when determining the oscillator frequency.

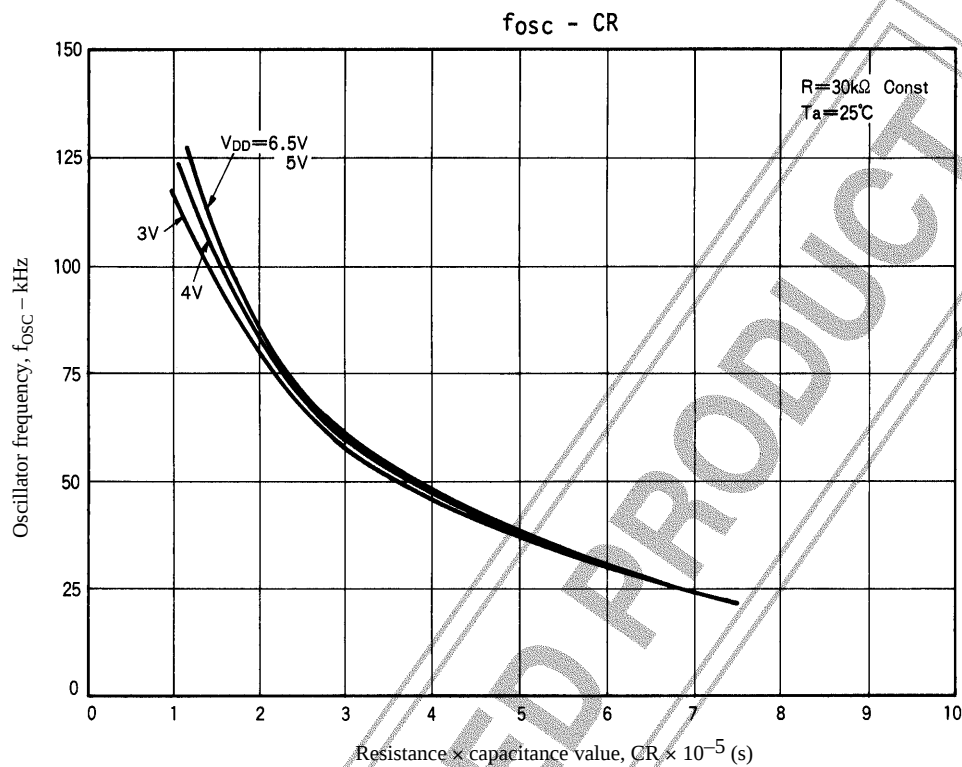


Figure 1 LC75821E, 75821W Oscillator Frequency vs. CR Constant

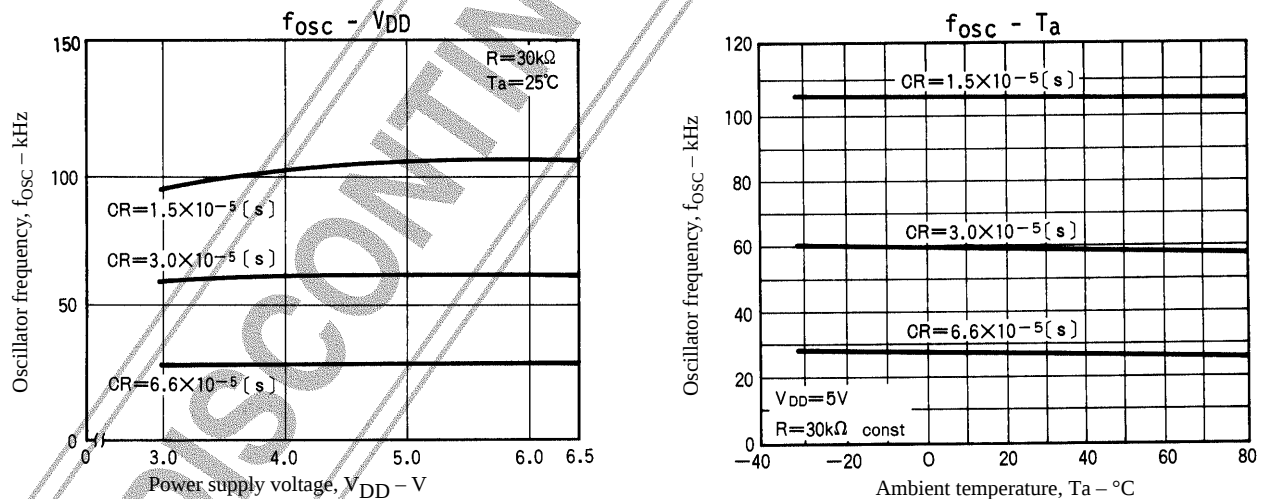


Figure 2 LC75821E, 75821W Oscillator Frequency vs. V_{DD}

Recommended range for external resistance: 10 to 100 kΩ (Carbon resistance)

Recommended range for external capacitance: 330 to 3300 pF

330 to 820 pF: (Ceramic capacitance with a zero temperature coefficient)

1000 to 3300 pF: (Mylar capacitance with a positive temperature coefficient)

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