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FIN424C / FIN425C

20-Bit Ultra-Low-Power Serializer / Deserializer for µController and RGB Displays

Features

Data & Control Bits	20
Frequency	10MHz
Capability	QVGA
Interface	Microcontroller / RGB
µController Usage	186 & m68
Selectable Edge Rates	Yes
Dynamic Current	9mA / Pair
Standby Current	10µA
Core Voltage (V _{DDA/S})	2.5 to 3.0V
I/O Voltage (V _{DDP})	1.6V to V _{DDA/S}
ESD	15KV (IEC)
Package	MLP-32 (5 x 5mm)
Ordering Information	FIN424CMLX FIN425CMLX

Applications

- Slider, Folder, and Clamshell Mobile Handsets
- GSM and CDMA Phones

Description

The FIN424C and FIN425C µSerDes™ are a low-power serializer/ deserializer pair that can help minimize the cost and power of an LCD interface. They are designed to operate transparently between the baseband processor and LCD. /WE and chip-select timing is maintained from the serializer to the deserializer. Through the use of serialization, the number of signals transferred from one point to another can be significantly reduced. Typical reduction is 5:1. Through the use of differential signaling, shielding, and EMI filters can also be minimized, further reducing the cost of serialization. Differential signaling is important for providing a noise-insensitive signal that can withstand radio and electrical noise sources. Major reduction in power consumption allows minimal impact on battery life in mobile applications.

Related Resources

For more information, please visit:

<http://www.fairchildsemi.com/products/interface/userdes.html>

Typical Application

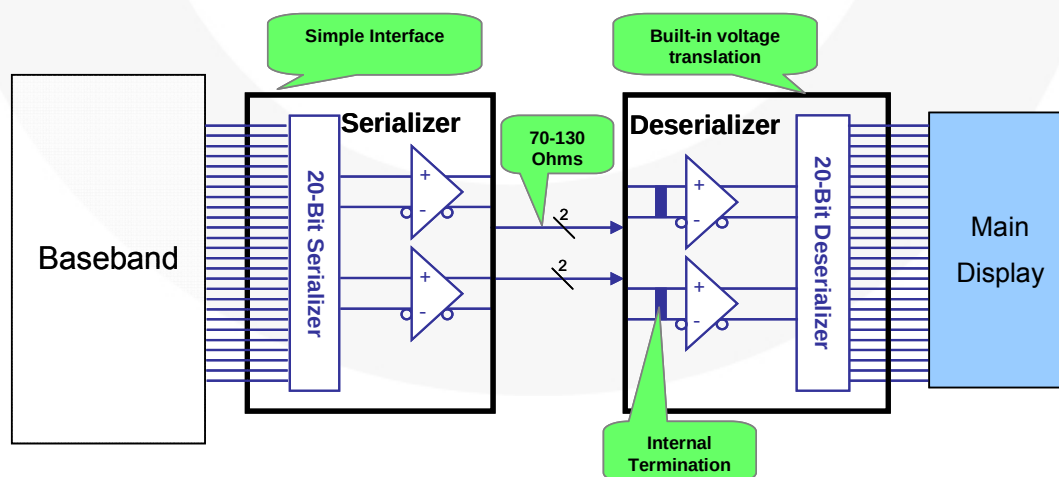


Figure 1. Mobile Phone Example

FIN424C Serializer Pin Descriptions

Pin Name	Description		
STRB	LVCMOS Strobe Signal for Latching Data into the Serializer (On Rising Edge)		
DP[19:0]	LVCMOS Data Input		
/RES	Low-Power Mode	0	Serializer Low Power
		1	Serializer Enabled
/STBY	SerDes Standby	0	Serializer and Deserializer in Low Power
		1	Serializer and Deserializer Enabled
Test	Internal Use (Should be GND)		
DS+, DS-	Serial Data Output		
CKS+, CKS-	Serial Clock Output		
VDDP	Power Supply for Parallel I/O and Internal Circuitry		
VDDS	Power Supply for Serial I/O		
VDDA	Power Supply for Core		
GND	Ground Pins		

Notes:

- 0 = V_{IL} ; 1 = V_{IH} .
- All GND and VDDP pins must be connected to ground and VDDP, respectively.

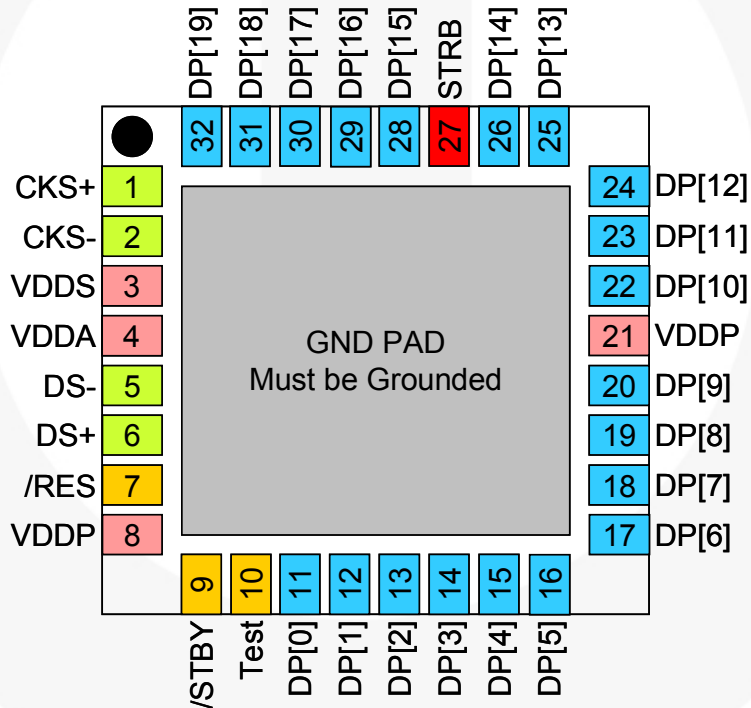


Figure 2. FIN424CMLX MLP-32 Pinout (Top Through View)

FIN425C Deserializer Pin Descriptions

Pin Name	Description		
WCLK	LVC MOS STRB Output		
DP[19:0]	LVC MOS Data Output		
/RES	Low-Power Mode	0	Deserializer Low Power
		1	Deserializer Enabled
SLEW	Parallel Output Edge Rate Control	0	Slow Output Edge Rates
		1	Fast Output Edge Rates
Test	Internal Use (Should be GND)		
DS+, DS-	Serial Data Input		
CKS+, CKS-	Serial Clock Input		
VDDP	Power Supply for Parallel I/O and internal circuitry		
VDDS	Power Supply for Serial I/O		
VDDA	Power Supply for Core		
GND	Ground Pins		

Notes:

- 0 = V_{IL} ; 1 = V_{IH} .
- All GND and VDDP pins must be connected to ground and VDDP, respectively.

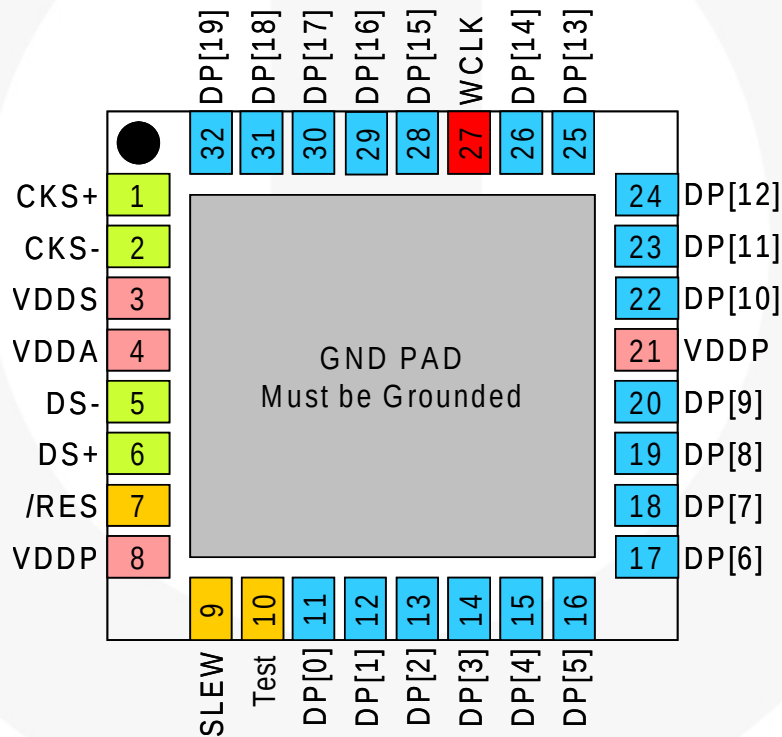


Figure 3. FIN425CMLX MLP-32 Pinout (Top Through View)

Table 1. Reset and Standby Modes / States

/RES FIN424C FIN425C	/STBY FIN424C	Mode	Pins	FIN424C Parallel Input State	FIN425C Parallel Output State
0	X	Reset Mode	DP[19:0] STRB / WCLK	Disabled Disabled	LOW HIGH
1	0	Standby Mode	DP[19:0] STRB / WCLK	Disabled Disabled	LAST STATE HIGH
1	1	Operating Mode	DP[19:0] STRB / WCLK	Enabled Enabled	ENABLED ENABLED

Application Diagram

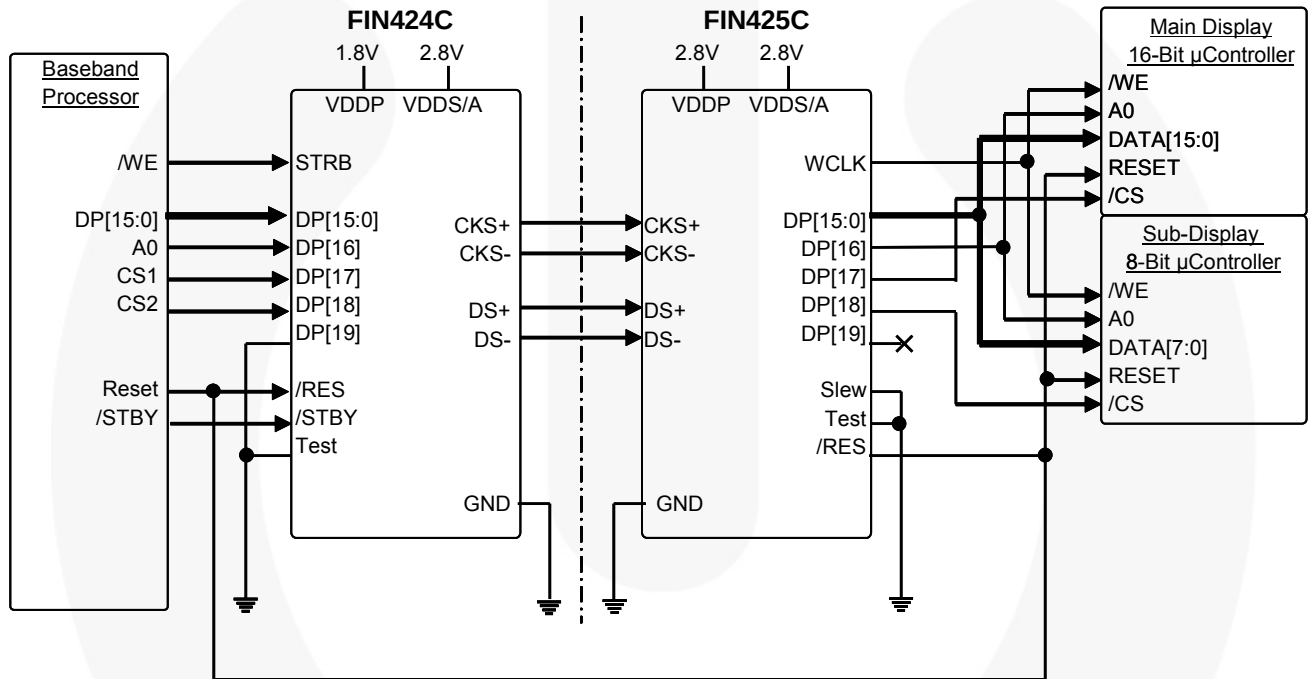


Figure 4. Dual-Display, 16-Bit, µController Interface

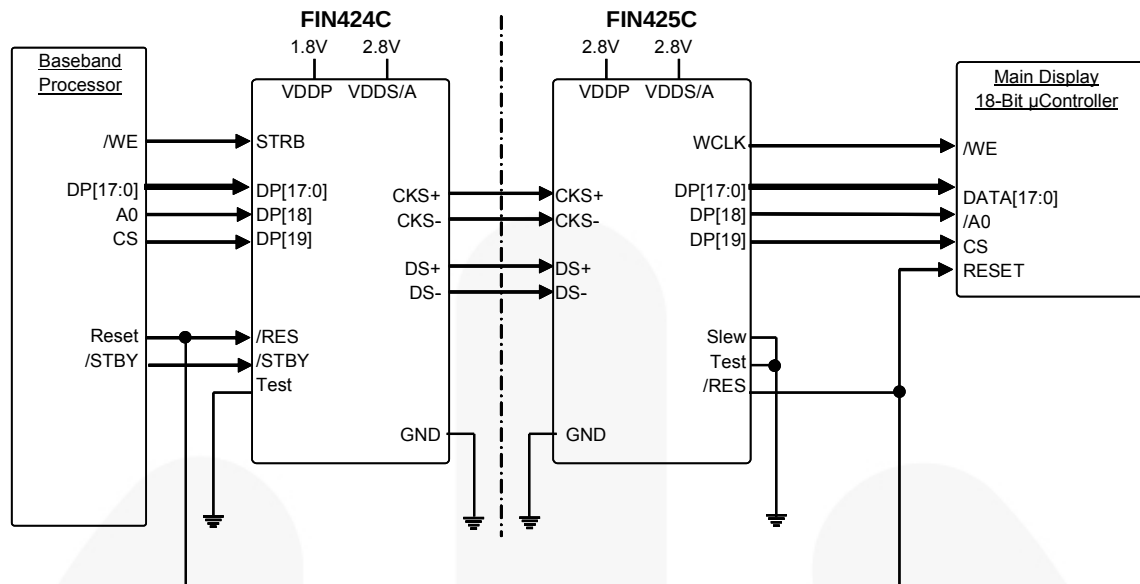


Figure 5. Single-Display, 18-Bit, μController Interface

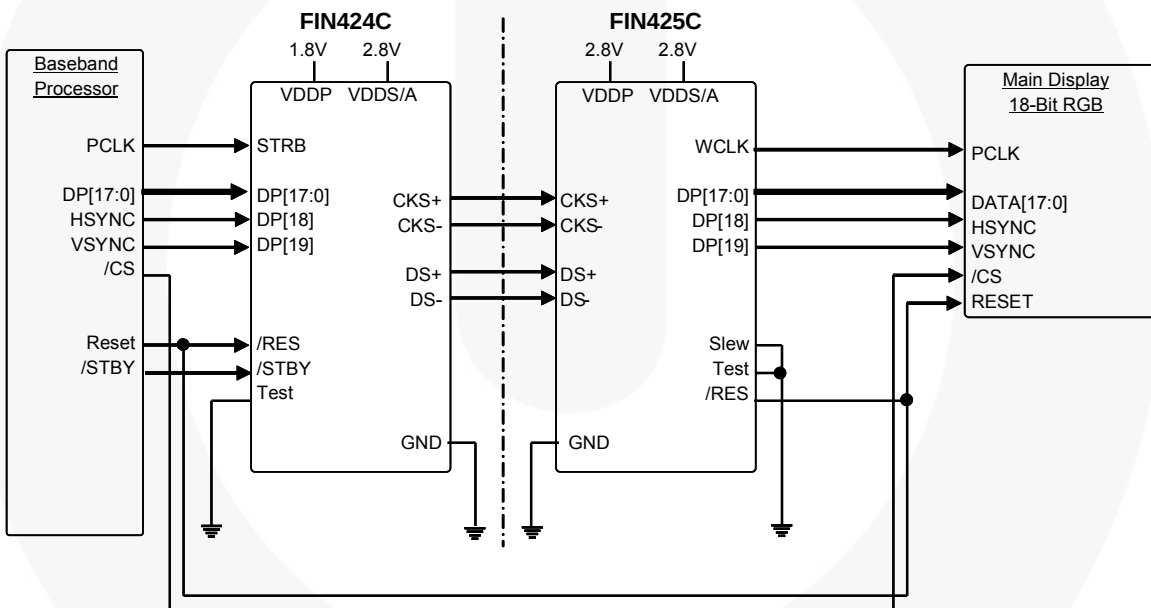


Figure 6. Single-Display, 18-Bit, RGB Interface

Additional Application Information

Flex Cabling: The serial I/O information is transmitted at a high serial rate. Care must be taken implementing this serial I/O flex cable. The following best practices should be used when developing the flex cabling or Flex PCB.

- Keep all four differential serial wires the same length.
- Do not allow noisy signals over or near differential serial wires. Example: No CMOS traces over differential serial wires.
- Use a design goal of 70 to 130Ω differential characteristic impedance.
- Do not place test points on differential serial wires.
- Design differential serial wires a minimum of 2cm away from the antenna.
- Visit Fairchild's website at <http://www.fairchildsemi.com/products/interface/userdes.html>, contact your sales representative, or contact Fairchild directly at interface@fairchildsemi.com for applications notes or flex guidelines.

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter	Min.	Max.	Unit
V_{DD}	Supply Voltage	-0.5	+3.6	V
V_{IO}	All Input / Output Voltage	-0.5	$V_{DDP}+0.5$	V
T_{STG}	Storage Temperature Range	-65	+150	°C
T_J	Maximum Junction Temperature		+150	°C
T_L	Lead Temperature (Soldering, Four Seconds)		+260	°C
ESD	IEC 61000 Board Level		15.0	kV
	Human Body Model, JESD22-A114	All Pins	7.5	
		Serial I/O, /RES, PAR/SPI to GND	14.0	

Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to absolute maximum ratings.

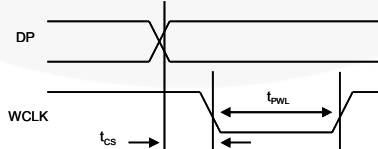
Symbol	Parameter	Min.	Max.	Unit
$V_{DDA}, V_{DDS}^{(5)}$	Supply Voltage	2.5	3.0	V
V_{DDP}	Supply Voltage	1.6	$V_{DDA/S}$	V
T_A	Operating Temperature	-30	+85	°C

Notes:

- V_{DDA} and V_{DDS} supplies must be hardwired together to the same power supply. V_{DDP} must be less than or equal to V_{DDA}/V_{DDS} .
- Typical values are tested at $T_A=25^{\circ}\text{C}$ and 2.75V.

Electrical Specifications

Values valid for over-supply voltage and operating temperature ranges unless otherwise specified.

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
DC Parallel I/O and Serial Characteristics						
V _{IH}	Input High Voltage		0.7 x V _{DDP}		V _{DDP}	V
V _{IL}	Input Low Voltage		GND		0.3 x V _{DDP}	V
V _{OH}	Output High Voltage	SLEW=0 I _{OH} =-250μA	0.8 x V _{DDP}			V
		SLEW=1 I _{OH} =-1mA				
V _{OL}	Output Low Voltage	SLEW=0 I _{OL} =250μA			0.2 x V _{DDP}	V
		SLEW=1 I _{OL} =1mA				
I _{IN}	Input Current		-5		5	μA
V _{GO}	Serial Input Voltage Ground Offset	FIN425C to FIN424C		0		V
Z	Serial Transmission Line Impedance		70	100	130	Ω
Power Characteristics						
I _{DYN_FIN424C}	Dynamic Current FIN424C	V _{DDA} /S=2.75V, V _{DDP} =1.8V, /STBY=1, /RES=1	5.44MHz		4	mA
I _{DYN_FIN425C}	Dynamic Current FIN425C	V _{DDA} /S=2.75V V _{DDP} =1.8V, /STBY=1, /RES=1, C _L =0pF	5.44MHz		5	mA
I _{BRST_FIN424C}	Burst Standby Current FIN424C	V _{DDA} /S=2.75V, V _{DDP} =1.8V, /STBY=1, /RST=1, No STROBE Signal,		1.3		mA
I _{BRST_FIN425C}	Burst Standby Current FIN425C	V _{DDA} /S=2.75V, V _{DDP} =1.8V, /STBY=1, /RST=1, No STROBE Signal, C _L =0pF		1.8		mA
I _{STBY}	Standby Current	FIN424C / FIN425C V _{DDS} /A=V _{DDP} =3.0V, /STBY=0, /RST=1			10	μA
I _{RES}	Reset Current	FIN424C / FIN425C V _{DDS} /A=V _{DDP} =3.0V, /RST=0			10	μA
AC FIN424C Specifications						
f _{WSTRB0}	Strobe Frequency		0		10	MHz
t _R , t _F	Input Edge Rates				40	ns
t _{S1}	DP Setup Time	DP Before STRBn ↑ ⁽⁷⁾	5			ns
t _{H1}	DP Hold Time	DP After STRBn ↑ ⁽⁷⁾	15			ns
AC FIN425C Specifications						
t _{R0} , t _{F0}	Output Edge Rates of WCLK	SLEW=0, C _L =5pF 20% to 80% ⁽⁷⁾	8		17	ns
		SLEW=1, C _L =5pF 20% to 80% ⁽⁷⁾			10	
t _{R1} , t _{F1}	Output Edge Rates of DP[19:0]	SLEW=0, C _L =5pF 20% to 80% ⁽⁷⁾	8		22	ns
		SLEW=1, C _L =5pF 20% to 80% ⁽⁷⁾			17	
t _{CS}	DP[19:0] to Falling edge of WCLK C _L =5pF 20% to 80%		0	4		
t _{PWL}	WCLK Output Pulse Width Low, Measured 30% to 30% ⁽⁷⁾		50	56		ns
AC Oscillator Specifications						
f _{OSC}	Serial Operating Frequency		240	275	310	MHz
t _{OSC-STBY}	Oscillator Stabilization Time After Standby	V _{DDA} =V _{DDS} =2.75V /RES=1, /STBY ↑ Transition		15	30	μs

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{OSC-RES}$	Oscillator Stabilization Time After Reset	$V_{DDA}=V_{DDS}=2.75V$ $/STBY=1, /RES \uparrow$ Transition		30	50	μs
AC Reset and Standby Timing						
$t_{STRB-RES}$	$/RES$ after last $STRBn \uparrow$		0			ns
$t_{STRB-STBY}$	Standby Time After Last Strobe		200			ns
$t_{VDD-SKEW}$	Allowed Power up Skew between V_{DDP} and $V_{DDA/S}$		$-\infty$		$+\infty$	ms
$t_{VDD-RES}$	Minimum Reset Low Time After V_{DD} Stable		20			μs
$t_{RES-STBY}$	$/STBY$ Wait Time After $/RES \uparrow$		20			μs

Note:

7. Characterized, but not production tested.

Physical Dimensions

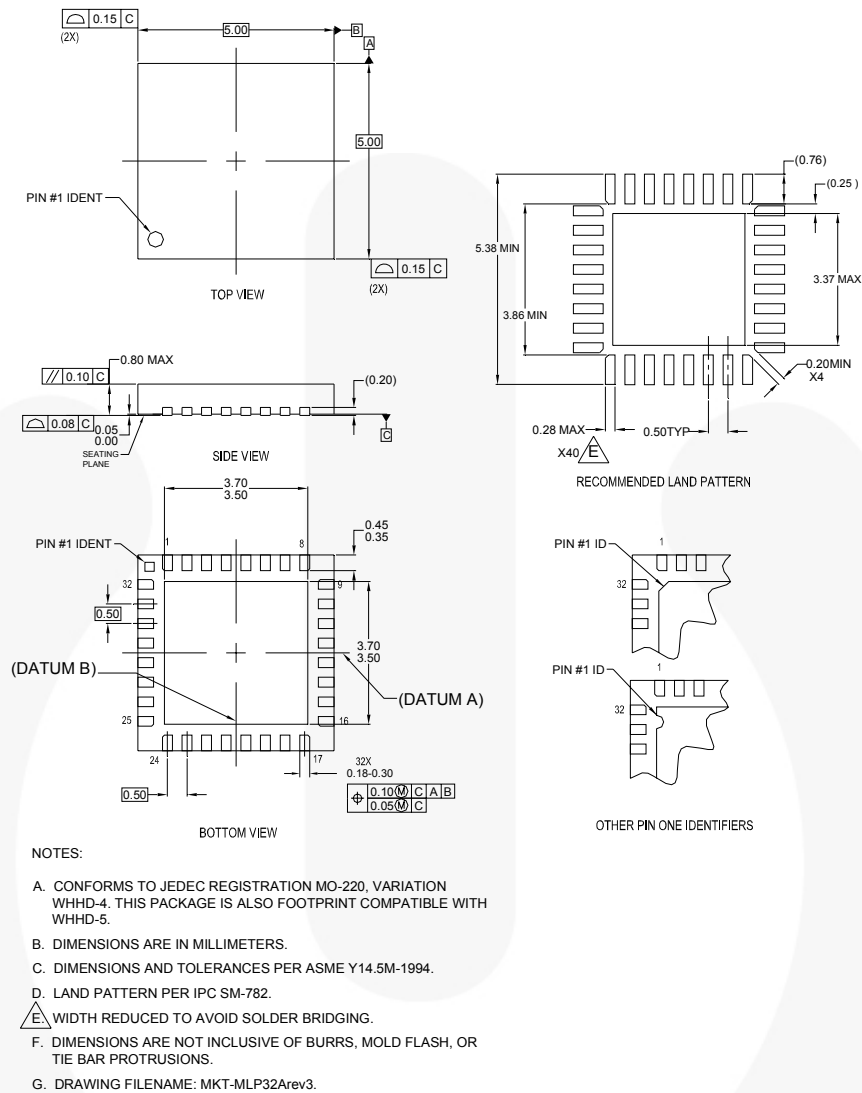


Figure 7. 32-Lead, Molded Leadless Package (MLP), QUAD, JEDEC MO-220, Variation WHHD-4, 5mm Square

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Ordering Information

Part Number	Operating Temperature Range	Eco Status	Package	Packing Method
FIN424CMLX	-30 to +85°C	Green	32-Lead, Molded Leadless Package (MLP), QUAD, JEDEC MO-220, Variation WHHD-4, 5mm Square	Tape and Reel
FIN425CMLX	-30 to +85°C	Green	32-Lead, Molded Leadless Package (MLP), QUAD, JEDEC MO-220, Variation WHHD-4, 5mm Square	Tape and Reel

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