

General Description

The iML7824 is a 4-channel low power, high voltage rail-to-rail Vcom/Gamma Buffer. It operates on power supplies from 5V to 20V and consume less than 1.2mA per amplifier. The device provides rail-to-rail output capability and common mode input ability beyond the rails, such that it can offer maximum dynamic range at any supply voltage.

The iML7824 also provides fast slew rate and settling times, and a high output drive capability of 300mA peak AC current (sink and source). The four amplifiers inside iML7824 are ideal for use as voltage reference buffers in TFT-LCD panel applications for TV, PC, Notebooks, and mobile computing devices.

The iML7824DA is available in a space saving 14-pin TSSOP package, and the iML7824HS is in 14-pin TSSOP package with heat sink pad. The iML7824CF is in 14-pin SOIC package. All three devices feature a standard operational amplifier pin out, and operate over a temperature range of -40 deg C to +85 deg C.

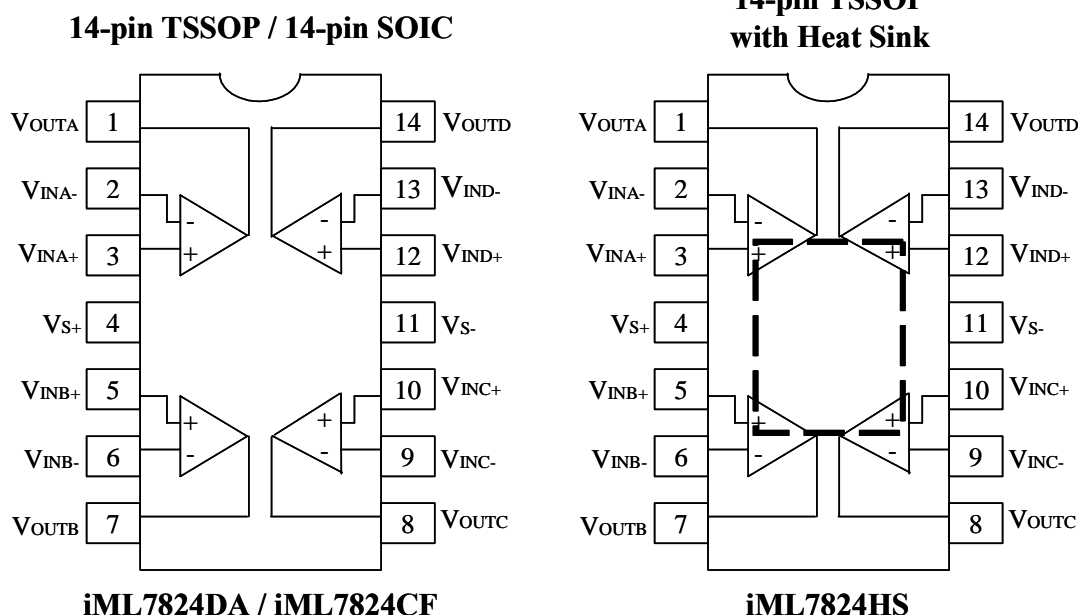
Features

- Beyond the rails input capability
- 300mA peak output AC current (typ)
- 30MHz – 3dB Bandwidth
- Rail-to-rail output swing
- Supply voltage = 5V to 20V
- Low supply current (per amplifier) = 1.2mA
- High slew rate = 30V/ μ s
- Unity-gain stable
- Ultra-small TSSOP Package

Applications

- TV TFT-LCD Panels
- PC TFT-LCD Monitors
- Personal Digital Assistants (PDA)
- Personal Communication Devices
- Portable Instrumentation
- Electronics Notebooks
- Electronics Games
- Touch-Screen Displays
- ADC/DAC Buffers
- Active Filters

Pin Diagrams





iNTEGRATED MEMORY LOGIC

Preliminary Specifications

iML7824

20V High Current Drive Rail-to-Rail VCOM/Gamma Buffer

Absolute Maximum Ratings (T_A = 25°C)

Caution: Values beyond absolute ratings can cause the device to be prematurely damaged. Absolute maximum ratings are stress ratings only and functional device operation is not guaranteed.

Supply Voltage between VS+ & VS-	+21.5V	Operating Temperature	-40°C to +85°C
Input Voltage	VS- - 0.5V, VS+ + 0.5V	Lead Temperature	260°C
Max. Continuous Output Current	80mA; 100mA (HS)	Max. Continuous Output AC Current	400mA (20% duty cycle)
Maximum Die Temperature	+150°C	ESD Voltage (HBM)	±2KV
Storage Temperature	-65°C to +150°C	ESD Voltage (MM)	±200V

Note: All parameters having Min/Max specifications are guaranteed. Typical values are for reference purpose only. Unless otherwise noted, all tests are pulsed tests at the specified temperature, therefore: T_J = T_C = T_A.

Electrical Characteristics

VS+ = +5V, VS- = -5V, with R_L = 10KΩ and C_L = 10pF @T_A = 25°C unless otherwise specified.

Parameter	Description	Condition	Min	Typ	Max	Units
Input Characteristics						
V _{os}	Input Offset Voltage	V _{CM} = 0V		3	15	mV
TCV _{os}	Average Offset Voltage Drift	(Measured over operating temperature range)		5		μV/°C
I _B	Input Bias Current	V _{CM} = 0V		2	50	nA
R _{IN}	Input Impedance			1		GΩ
C _{IN}	Input Capacitance			2.0		pF
CMIR	Common-mode Input Range		-5.5		+5.5	V
CMRR	Common-mode Rejection Ratio	-5.5V ≤ V _{IN} ≤ +5.5V	50	72		dB
A _{VOL}	Open-Loop Gain	-4.5V ≤ V _{out} ≤ +4.5V	65	78		dB
Output Characteristics						
V _{OL}	Output Swing Low	I _L = -5mA		-4.94	-4.88	V
V _{OH}	Output Swing High	I _L = +5mA	4.88	4.94		V
I _{OUT}	Peak Output AC Current	V _{out} reaches within ±3V from rails		±300		mA
Power Supply Performance						
PSRR	Power Supply Rejection Ratio	V _S from ±2.25V to ±7.75V	60	80		dB
I _S	Supply Current (per Amplifier)	No Load		1.2		mA
Dynamic Performance						
SR	Slew Rate (rising & falling edges)	-4.0V ≤ V _{out} ≤ +4.0V		27		V/μs
t _s	Settling to ±0.1% (A _v = +1)	V _O = 2.0V Step @ C _L = 0pF		100		ns
BW	-3dB Bandwidth			28		MHz
GBWP	Gain-Bandwidth Product			22		MHz
PM	Phase Margin			50		°
CHS	Channel Separation	f = 5MHz		90		dB



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Electrical Characteristics

VS+ = +16V, VS- = 0V, with RL = 10KΩ and CL = 10pF @TA = 25°C unless otherwise specified.

Parameter	Description	Condition	Min	Typ	Max	Units
Input Characteristics						
Vos	Input Offset Voltage	V _{CM} = 8V		3	15	mV
TCVos	Average Offset Voltage Drift	(Measured over operating temperature range)		5		μV/°C
I _B	Input Bias Current	V _{CM} = 8V		2	50	nA
R _{IN}	Input Impedance			1		GΩ
C _{IN}	Input Capacitance			2.0		pF
CMIR	Common-mode Input Range		-0.5		+15.5	V
CMRR	Common-mode Rejection Ratio	-0.5V ≤ V _{out} ≤ +16.5V	50	75		dB
A _{VOL}	Open-Loop Gain	+0.5V ≤ V _{out} ≤ +15.5V	68	80		dB
Output Characteristics						
V _{OL}	Output Swing Low	I _L = -5mA		70	120	mV
V _{OH}	Output Swing High	I _L = +5mA	15.88	15.94		V
I _{OUT}	Peak Output AC Current	V _{out} reaches within ±3V from rails		±300		mA
Power Supply Performance						
PSRR	Power Supply Rejection Ratio	V _S from +4.5V to +16.5V	60	80		dB
I _S	Supply Current (per Amplifier)	No Load		1.2		mA
Dynamic Performance						
SR	Slew Rate (rising & falling edges)	+1.0V ≤ V _{out} ≤ +15.0V		30		V/μs
ts	Settling to ±0.1% (A _V = +1)	V _O = 2.0V Step @ C _L = 0pF		100		ns
BW	-3dB Bandwidth			30		MHz
GBWP	Gain-Bandwidth Product			24		MHz
PM	Phase Margin			50		°
CHS	Channel Separation	f = 5MHz		90		dB

Electrical Characteristics

VS+ = +5V, VS- = 0V, with RL = 10KΩ and CL = 10pF to 2.5V @TA = 25°C unless otherwise specified.

Parameter	Description	Condition	Min	Typ	Max	Units
Input Characteristics						
Vos	Input Offset Voltage	V _{CM} = 2.5V		3	15	mV
TCVos	Average Offset Voltage Drift	(Measured over operating temperature range)		5		μV/°C
I _B	Input Bias Current	V _{CM} = 2.5V		2	50	nA
R _{IN}	Input Impedance			1		GΩ
C _{IN}	Input Capacitance			2.0		pF
CMIR	Common-mode Input Range		-0.5		+5.5	V
CMRR	Common-mode Rejection Ratio	-0.5V ≤ V _{IN} ≤ +5.5V	50	70		dB



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A_{VOL}	Open-Loop Gain	$+0.5V \leq V_{out} \leq +4.5V$	60	70		dB
Output Characteristics						
V_{OL}	Output Swing Low	$I_L = -5mA$		70	140	mV
V_{OH}	Output Swing High	$I_L = +5mA$	4.86	4.94		V
I_{OUT}	Peak Output AC Current	V_{out} reaches within $\pm 3V$ from rails		± 300		mA
Power Supply Performance						
PSRR	Power Supply Rejection Ratio	V_S from +4.5V to +15.5V	60	80		dB
I_S	Supply Current (per Amplifier)	No Load		1.0		mA
Dynamic Performance						
SR	Slew Rate (rising & falling edges)	$+1.0V \leq V_{out} \leq +4.0V$		25		V/ μ s
t_s	Settling to $\pm 0.1\%$ ($A_V = +1$)	$V_O = 2.0V$ Step @ $C_L = 0pF$		100		ns
BW	-3dB Bandwidth			25		MHz
GBWP	Gain-Bandwidth Product			20		MHz
PM	Phase Margin			50		$^\circ$
CHS	Channel Separation	$f = 5MHz$		90		dB

Pin Descriptions

iML7824DA	iML7824HS	iML7824CF	Pin Name	Function
1	1	1	V_{OUTA}	Output of Amplifier-A
2	2	2	V_{INA-}	Inverting Input of Amplifier-A
3	3	3	V_{INA+}	Non-inverting Input of Amplifier-A
4	4	4	VS+	Positive Power Supply
5	5	5	V_{INB+}	Non-inverting Input of Amplifier-B
6	6	6	V_{INB-}	Inverting Input of Amplifier-B
7	7	7	V_{OUTB}	Output of Amplifier-B
8	8	8	V_{OUTC}	Output of Amplifier-C
9	9	9	V_{INC-}	Inverting Input of Amplifier-C
10	10	10	V_{INC+}	Non-inverting Input of Amplifier-C
11	11	11	VS-	Negative Power Supply
12	12	12	V_{IND+}	Non-inverting Input of Amplifier-D
13	13	13	V_{IND-}	Inverting Input of Amplifier-D
14	14	14	V_{OUTD}	Output of Amplifier-D

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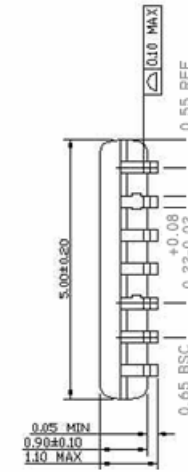
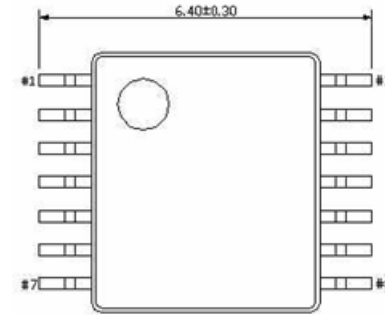
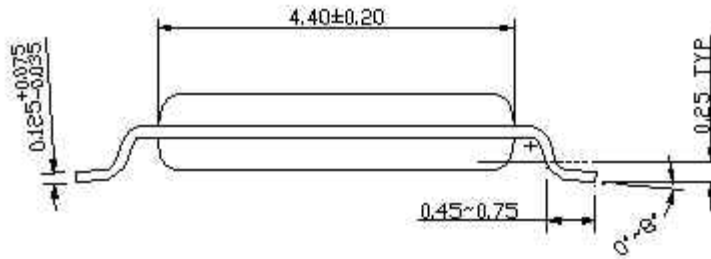
Thermal Impedance

Package	θ_{JC}	θ_{JA}	Remark
iML7824DA	32°C/W	165°C/W	Single layer low effective thermal conductivity test board per JEDEC JESD51-3
		100°C/W	4-layer high effective thermal conductivity test board per JEDEC JESD51-7
iML7824HS	30°C/W	125°C/W	Single layer low effective thermal conductivity test board per JEDEC JESD51-3
		35°C/W	4-layer high effective thermal conductivity test board per JEDEC JESD51-7

Ordering Information

Package	Description	Tape & Reel	IML Drawing
14-pin TSSOP	iML7824DA	-	IMLP-001
	iML7824DA-TR	13" (2500 pieces / Reel)	
14-pin TSSOP (with heat sink pad)	iML7824HS	-	IMLP-003
	iML7824HS-TR	13" (2500 pieces / Reel)	
14-pin SOIC	iML7824CF	-	IMLP-008
	iML7824CF-TR	13" (2500 pieces / Reel)	

■ 14 TSSOP Package Dimension



□ 14TSSOP PKG Dimension

Item	Total Length	Total Height	Stand Off	Foot Length	Foot Angle	Lead Coplanarity
Spec	6.40±0.3	Max 1.1	Min 0.05	0.45~0.75	0~8°	Max 3.0mil
1	6.43	1.01	0.09	0.60	2°08	0.00
2	6.43	1.00	0.09	0.61	2°75	0.20
3	6.42	1.00	0.10	0.61	1°60	0.20
4	6.43	1.00	0.11	0.62	3°12	0.20
5	6.43	1.01	0.10	0.60	2°06	0.00
6	6.43	1.00	0.09	0.61	3°26	0.00
7	6.43	1.00	0.08	0.65	2°48	0.00
8	6.44	1.01	0.10	0.64	3°52	0.20
9	6.44	0.99	0.09	0.64	1°87	0.00
10	6.44	1.00	0.08	0.62	2°79	0.00
11	6.43	1.00	0.09	0.61	3°43	0.00
Mean	6.43	1.00	0.09	0.62		0.07
Min	6.42	0.99	0.08	0.60		0.00
Max	6.44	1.01	0.11	0.65		0.20