500MHz Rail-to-Rail Amplifiers

The EL8102 and EL8103 represent single rail-to-rail amplifiers with a -3dB bandwidth of 500MHz and slew rate of 600V/µs. Running off a very low 5.6mA supply current, the EL8102 and EL8103 also feature inputs that go to 0.15V below the V_S- rail.

The EL8102 includes a fast-acting disable/power-down circuit. With a 25ns disable and a 200ns enable, the EL8102 is ideal for multiplexing applications.

The EL8102 and EL8103 are designed for a number of general purpose video, communication, instrumentation, and industrial applications. The EL8102 is available in 8-pin SO and 6-pin SOT-23 packages and the EL8103 is available in a 5-pin SOT-23 package. All are specified for operation over the -40°C to +85°C temperature range.

Ordering Information

PART NUMBER	PACKAGE	TAPE & REEL	OUTLINE #
EL8102IS	8-Pin SO	-	MDP0027
EL8102IS-T7	8-Pin SO	7”	MDP0027
EL8102IS-T13	8-Pin SO	13”	MDP0027
EL8102IW	6-Pin SOT-23	-	MDP0038
EL8102IW-T7	6-Pin SOT-23	7”	MDP0038
EL8102IW-T13	6-Pin SOT-23	13”	MDP0038
EL8103IW	5-Pin SOT23	-	MDP0038
EL8103IW-T7	5-Pin SOT23	7”	MDP0038
EL8103IW-T13	5-Pin SOT23	13”	MDP0038

Features

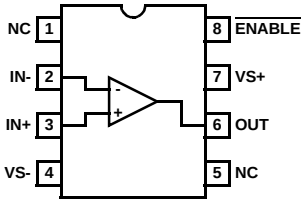
- 500MHz -3dB bandwidth
- 600V/µs slew rate
- Low supply current = 5.6mA
- Supplies from 3V to 5.5V
- Rail-to-rail output
- Input to 0.15V below V_S-
- Fast 25ns disable (EL8102 only)
- Low cost

Applications

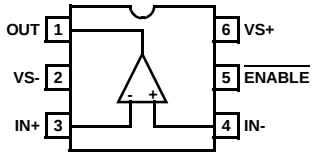
- Video amplifiers
- Portable/hand-held products
- Communications devices

Pinouts

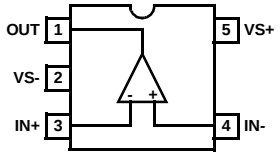
EL8102
(8-PIN SO)
TOP VIEW



EL8102
(6-PIN SOT-23)
TOP VIEW



EL8103
(5-PIN SOT-23)
TOP VIEW



Absolute Maximum Ratings (T_A = 25°C)

Supply Voltage from V_S+ to V_S- 5.5V
Input Voltage . . . . . V_S+ + 0.3V to V_S- - 0.3V
Differential Input Voltage 2V
Continuous Output Current 40mA
Power Dissipation . . . . . See Curves
Storage Temperature . . . . . -65°C to +125°C
Ambient Operating Temperature . . . . . -40°C to +85°C
Operating Junction Temperature . . . . . +125°C

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

IMPORTANT NOTE: All parameters having Min/Max specifications are guaranteed. Typ values are for information purposes only. Unless otherwise noted, all tests are at the specified temperature and are pulsed tests, therefore: $T_J = T_C = T_A$

Electrical Specifications

V_S+ = 5V, V_S- = GND, T_A = 25°C, V_{CM} = 2.5V, R_L to 2.5V, A_V = 1, unless otherwise specified.

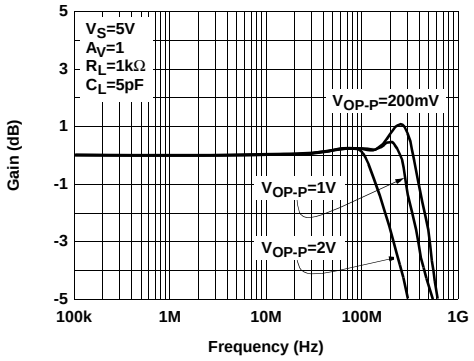
PARAMETER	DESCRIPTION	CONDITIONS	MIN	TYP	MAX	UNIT
INPUT CHARACTERISTICS						
V_{OS}	Offset Voltage		-8	-0.8	+8	mV
TCV_{OS}	Offset Voltage Temperature Coefficient	Measured from T_{MIN} to T_{MAX}		3		µV/°C
IB	Input Bias Current	V_{IN} = 0V	-9	-6		µA
I_{OS}	Input Offset Current	V_{IN} = 0V		0.1	0.6	µA
TCI_{OS}	Input Bias Current Temperature Coefficient	Measured from T_{MIN} to T_{MAX}		2		nA/°C
CMRR	Common Mode Rejection Ratio	V_{CM} = -0.15V to +3.5V	70	95		dB
CMIR	Common Mode Input Range		V_S- - 0.15		V_S+ - 1.5	V
R_{IN}	Input Resistance	Common Mode		3.5		MΩ
C_{IN}	Input Capacitance			0.5		pF
AVOL	Open Loop Gain	V_{OUT} = +1.5V to +3.5V, R_L = 1kΩ to GND	75	90		dB
		V_{OUT} = +1.5V to +3.5V, R_L = 150Ω to GND		80		dB
OUTPUT CHARACTERISTICS						
R_{OUT}	Output Resistance	A_V = +1		30		mΩ
V_{OP}	Positive Output Voltage Swing	R_L = 1kΩ	4.85	4.9		V
		R_L = 150Ω	4.6	4.7		V
V_{ON}	Negative Output Voltage Swing	R_L = 150Ω to 0V		100	150	mV
		R_L = 1kΩ to 0V		25	50	mV
I_{OUT}	Linear Output Current			65		mA
I_{SC} (source)	Short Circuit Current	R_L = 10Ω	70	80		mA
I_{SC} (sink)	Short Circuit Current	R_L = 10Ω	120	150		mA
POWER SUPPLY						
PSRR	Power Supply Rejection Ratio	V_S+ = 4.5V to 5.5V	70	95		dB
I_{S-ON}	Supply Current - Enabled			5.6	6	mA
I_{S-OFF}	Supply Current - Disabled			30		µA
ENABLE (EL8102 ONLY)						
t_{EN}	Enable Time			200		ns
t_{DS}	Disable Time			25		ns
V_{IH-ENB}	$\overline{\text{ENABLE}}$ Pin Voltage for Power-up			0.8		V
V_{IL-ENB}	$\overline{\text{ENABLE}}$ Pin Voltage for Shut-down			2		V

Electrical Specifications $V_S+ = 5V$, $V_S- = GND$, $T_A = 25°C$, $V_{CM} = 2.5V$, R_L to 2.5V, $A_V = 1$, unless otherwise specified.

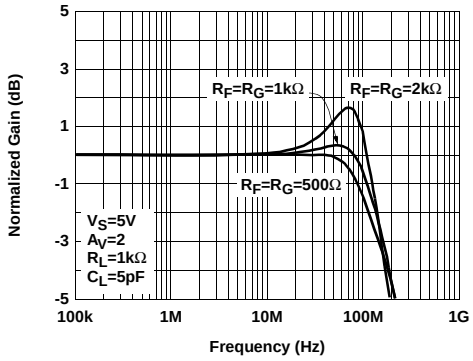
PARAMETER	DESCRIPTION	CONDITIONS	MIN	TYP	MAX	UNIT
I_{IH-ENB}	$\overline{ENABLE}$ Pin Input Current High			8.6		µA
I_{IL-ENB}	$\overline{ENABLE}$ Pin Input for Current Low			0.01		µA
AC PERFORMANCE						
BW	-3dB Bandwidth	$A_V = +1$, $R_F = 0Ω$, $C_L = 5pF$		500		MHz
		$A_V = -1$, $R_F = 1kΩ$, $C_L = 5pF$		140		MHz
		$A_V = +2$, $R_F = 1kΩ$, $C_L = 5pF$		165		MHz
		$A_V = +10$, $R_F = 1kΩ$, $C_L = 5pF$		18		MHz
BW	±0.1dB Bandwidth	$A_V = +1$, $R_F = 0Ω$, $C_L = 5pF$		20		MHz
Peak	Peaking	$A_V = +1$, $R_L = 1kΩ$, $C_L = 5pF$		1		dB
GBWP	Gain Bandwidth Product			200		MHz
PM	Phase Margin	$R_L = 1kΩ$, $C_L = 5pF$		55		°
SR	Slew Rate	$A_V = 2$, $R_L = 100Ω$, $V_{OUT} = 0.5V$ to 4.5V	500	600		V/µs
t_R	Rise Time	$2.5V_{STEP}$, 20% - 80%		4		ns
t_F	Fall Time	$2.5V_{STEP}$, 20% - 80%		2		ns
OS	Overshoot	200mV step		10		%
t_{PD}	Propagation Delay	200mV step		1		ns
t_S	0.1% Settling Time	200mV step		15		ns
dG	Differential Gain	$A_V = +2$, $R_F = 1kΩ$, $R_L = 150Ω$		0.01		%
dP	Differential Phase	$A_V = +2$, $R_F = 1kΩ$, $R_L = 150Ω$		0.01		°
e_N	Input Noise Voltage	f = 10kHz		12		nV/√Hz
i_N+	Positive Input Noise Current	f = 10kHz		1.7		pA/√Hz
i_N-	Negative Input Noise Current	f = 10kHz		1.3		pA/√Hz

Typical Performance Curves

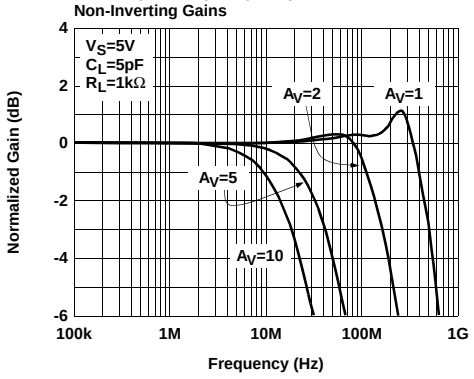
Frequency Response for Various Output Voltage Levels



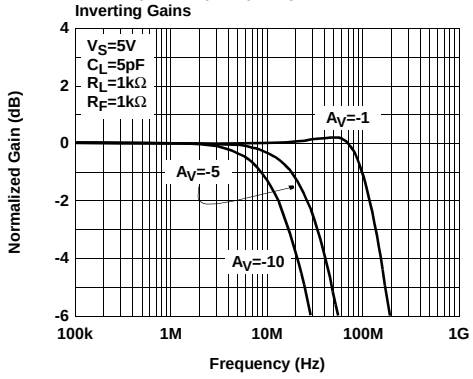
Small Signal Frequency Response vs R_F and R_G



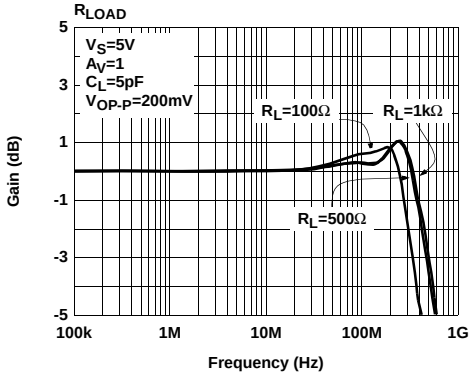
Small Signal Frequency Response for Various Non-Inverting Gains



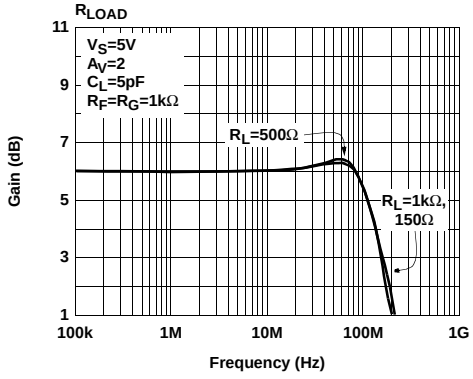
Small Signal Frequency Response for Various Inverting Gains



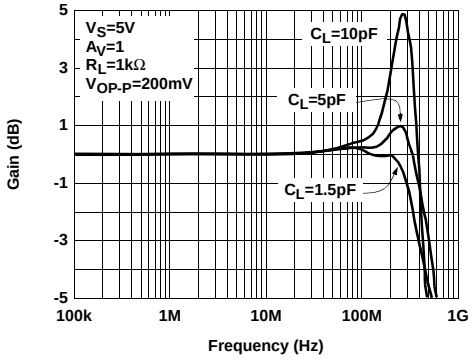
Small Signal Frequency Response vs Various R_{LOAD}



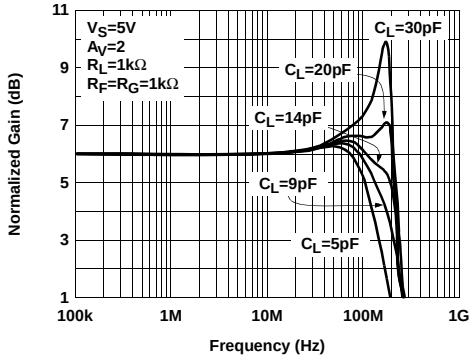
Small Signal Frequency Response vs Various R_{LOAD}



Small Signal Frequency Response vs C_L

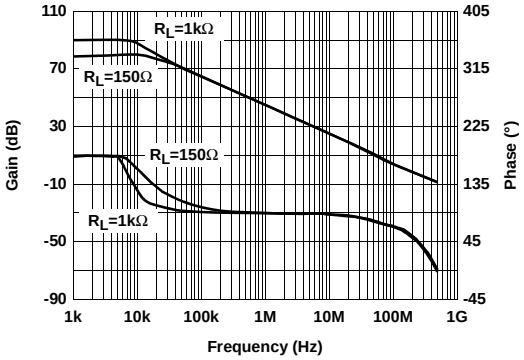


Small Signal Frequency Response for Various C_L

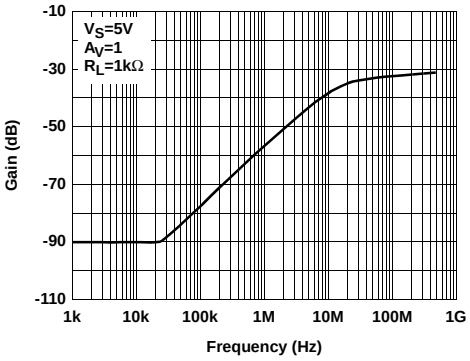


Typical Performance Curves

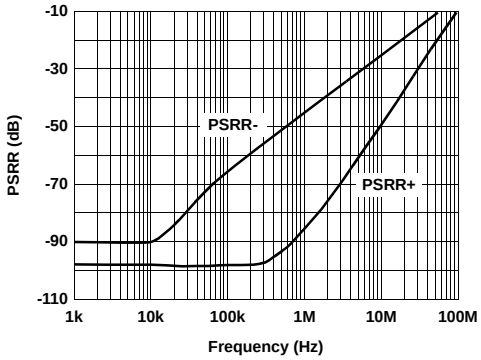
Open Loop Gain and Phase vs Frequency



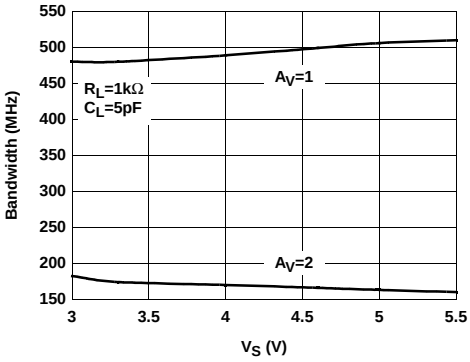
Disabled Output Isolation Frequency Response



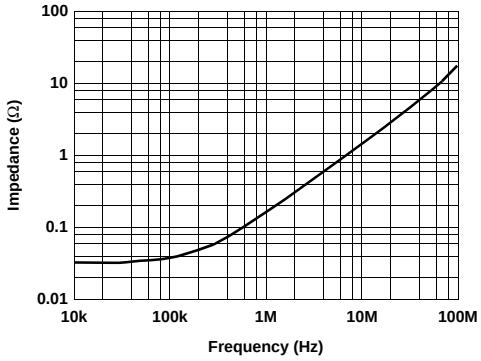
Power Supply Rejection Ratio vs Frequency



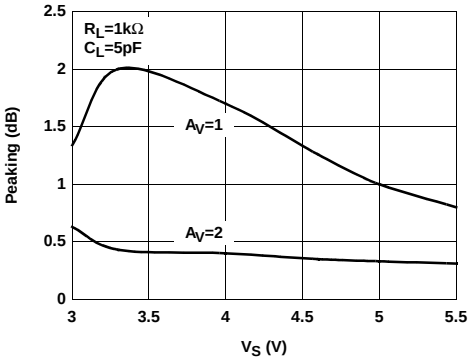
Small Signal Bandwidth vs Supply Voltage



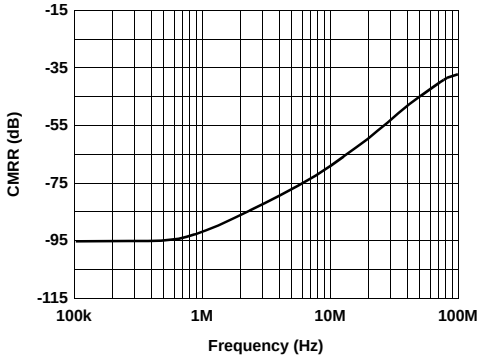
Output Impedance vs Frequency



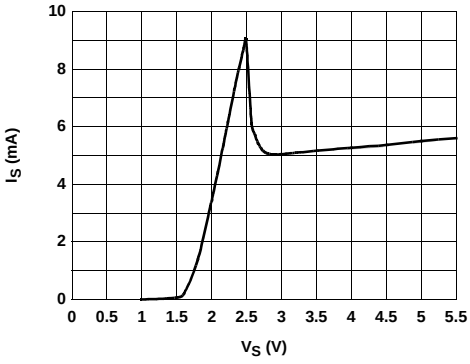
Small Signal Peaking vs Supply Voltage



Common-Mode Rejection Ratio vs Frequency

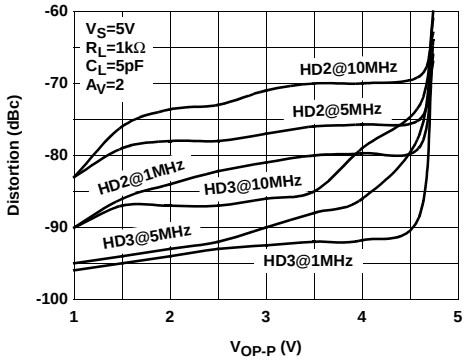


Supply Current vs Supply Voltage

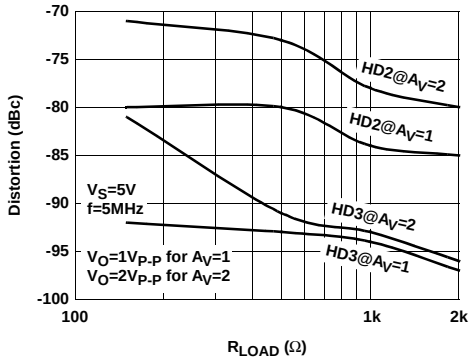


Typical Performance Curves

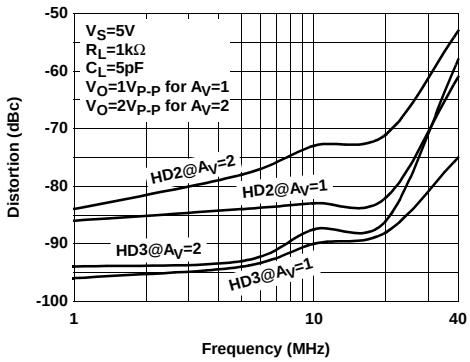
Harmonic Distortion vs Output Voltage



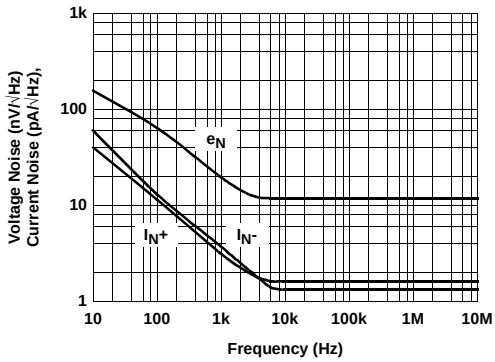
Harmonic Distortion vs Load Resistance



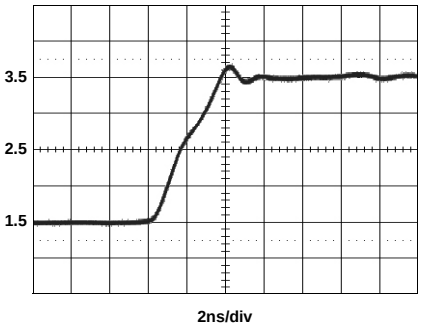
Harmonic Distortion vs Frequency



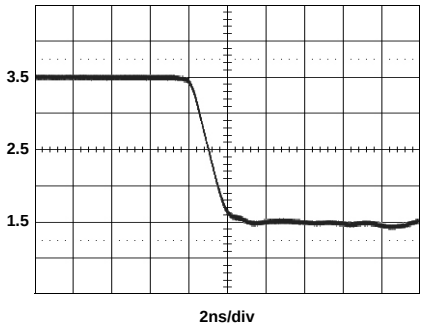
Voltage and Current Noise vs Frequency



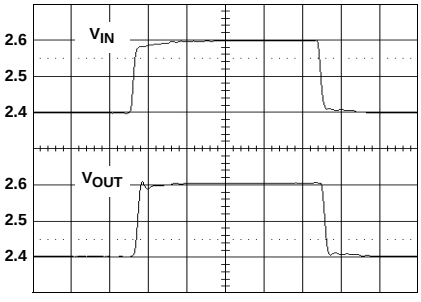
Large Signal Transient Response - Rising
V_S=5V, A_V=1, R_L=1kΩ to 2.5V, C_L=5pF



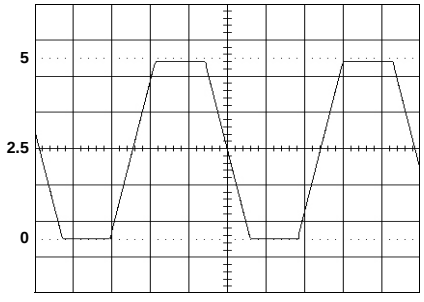
Large Signal Transient Response - Falling
V_S=5V, A_V=1, R_L=1kΩ to 2.5V, C_L=5pF



Small Signal Transient Response
V_S=5V, A_V=1, R_L=1kΩ to 2.5V, C_L=5pF

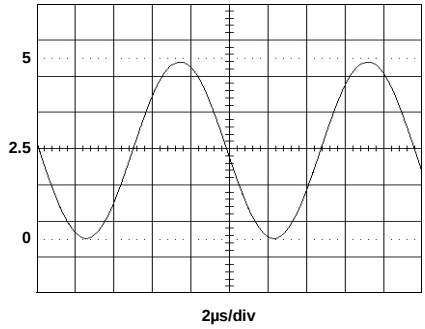


Output Swing
V_S=5V, A_V=5, R_L=1kΩ to 2.5V



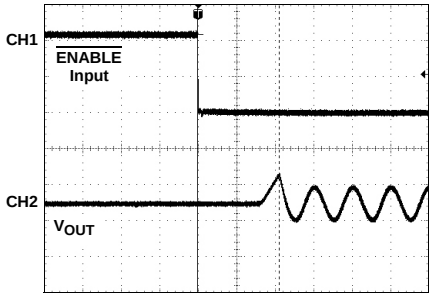
Typical Performance Curves

Output Swing
V_S=5V, A_V=5, R_L=1kΩ to 2.5V



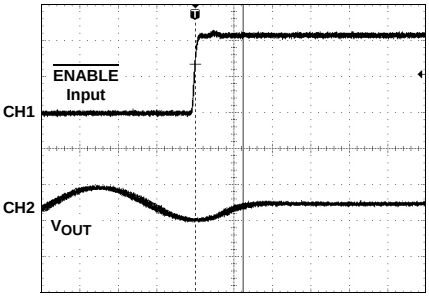
2µs/div

Enabled Response



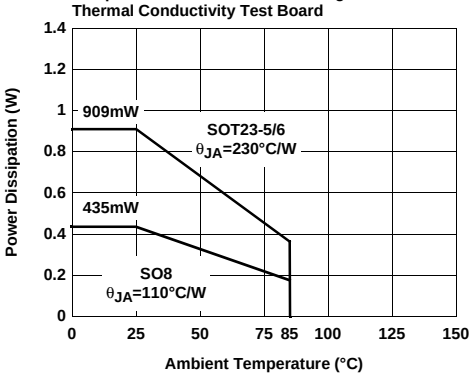
CH1, CH2, 1V/div, M=100ns

Disabled Response



CH1, CH2, 0.5V/div, M=20ns

Package Power Dissipation vs Ambient Temperature - JEDEC JESD51-7 High Effective Thermal Conductivity Test Board



Package Power Dissipation vs Ambient Temperature - JEDEC JESD51-3 Low Effective Thermal Conductivity Test Board