DESCRIPTION

MAX487ESA is an RS-485/RS-422 transceiver powered by+5.0V and equipped with ± 16kV ESD protection. The entire series has a hot swappable function, which can eliminate transient fault signals on the bus when powered on or hot plugged in.

The MAX487ESA has a low swing rate driver that can reduce EMI and reflections caused by improper terminal matching cables, achieving error free data transmission of up to 500kbps. MAX487ESA is used for half duplex communication.

The receiver of MAX487ESA has 1/8 unit load input impedance and can be connected to up to 256 transceivers on the bus.

MAX487ESA adopts 8-pin DIP and 8-pin SOP packaging.

ABSOLUTE MAXIMUM RATINGS

Supply Voltage (V_{CC}) 6V
Control Input Voltage -0.3V to 6V
Driver Input Voltage (DI) -0.3V to 6V

Driver Output Voltage (A, B) -7V to +12V
Receiver Input Voltage (A, B) -7V to +12V
Receiver Output Voltage (RO) -0.3V to (VCC + 0.3V)

Continuous Power Dissipation (T_A= +70°C)
8-Pin SO (derate 5.88mW/°C above +70°C) 500mW
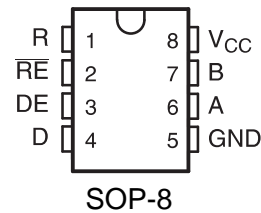Operating Temperature Ranges 0°C to +70°C
Storage Temperature Range -65°C to +150°C
Lead Temperature (soldering, 10sec) +300°C

PIN CONFIGURATION

SOP-8

FEATURES

· Low power shutdown mode
· DE and $\overline{RE}$ adopt a hot swappable input structure
· Up to 256 transceivers with swing are allowed to be mounted on the bus
· Rate limiting function helps achieve error free data transmission
· I/O port adopts enhanced ESD protection (± 16kV IEC 61000-4-2 model)

APPLICATIONS

· RS-422/RS-485 communication
· Digital electricity and water meters, industrial control
· Industrial embedded computers and peripherals, security monitoring systems
· Routers and switches, instruments and meters, level conversion
· EMI sensitive transceiver applications

DC ELECTRICAL CHARACTERISTICS

(V_{CC} = 5V ±0.25, T_A = T_{MIN} to T_{MAX}, unless otherwise noted, T_A = 25°C)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNITS
No-Load Supply Current	I_{CC}	$\overline{RE}$ = 0V or V_{CC}	DE = V_{CC}		530		µA
			DE = 0V		475		
Supply Current in Shutdown	I_{SHDN}	DE = 0V, $\overline{RE}$ = V_{CC}			0.5	10	µA
Driver Short-Circuit Current, V_O = High	I_{OSD1}	-7V ≤ V_O ≤12V				250	mA
Driver Short-Circuit Current, V_O = Low	I_{OSD2}	-7V ≤ V_O ≤12V		-250			mA
Receiver Short-Circuit Current	I_{OSR}	0V ≤ V_O ≤ V_{CC}		7		95	mA
ESD Protection		A, B, Y and Z pins, tested using Human Body Model			±16		kV
Driver Input to Output	t_{PLH}	R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 50pF				1000	ns
	t_{PHL}					1000	
Driver Output Skew to Output	t_{SKEW}	R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 50pF				±140	ns
Driver Rise or Fall Time	t_R, t_F	R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF				900	ns
Driver Enable to Output High	t_{ZH}	C_L = 100pF, S3 closed				2500	ns
Driver Enable to Output Low	t_{ZL}	C_L = 100pF, S2 closed				2500	ns
Driver Disable Time from Low	t_{LZ}	C_L = 15pF, S2 closed				100	ns
Driver Disable Time from High	t_{HZ}	C_L = 15pF, S3 closed				100	ns
Receiver Input to Output	t_{PLH}, t_{PHL}	R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF		20	60	200	ns
| t_{PLH} - t_{PHL} | Differential Receiver Skew	t_{SKD}	R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF				±30	ns
Receiver Enable to Output Low	t_{ZL}	C_{RL} = 15pF, S1 closed			20	50	ns
Receiver Enable to Output High	t_{ZH}	C_{RL} = 15pF, S2 closed			20	50	ns
Receiver Disable Time from Low	t_{LZ}	C_{RL} = 15pF, S1 closed			20	50	ns
Receiver Disable Time from High	t_{HZ}	C_{RL} = 15pF, S2 closed			20	50	ns
Maximum Data Rate	f_{MAX}				500		kbps
Time to Shutdown	t_{SHDN}	MAX481E (Note 5)		50		700	ns
Receiver Enable from Shutdown to Output High	$t_{ZH(SHDN)}$	C_L = 15pF, S2 closed				5500	ns
Receiver Enable from Shutdown to Output Low	$t_{ZL(SHDN)}$	C_L = 15pF, S1 closed				5500	ns

SWITCHING CHARACTERISTICS

(V_{CC} = 5.0V ±5% , T_A = 25°C)

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Driver Input to Output	t_{PLH}	R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 50pF			1000	ns
	t_{PHL}				1000	
Driver Output Skew to Output	t_{SKEW}	R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 50pF			±140	ns
Driver Rise or Fall Time	t_R, t_F	R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF			900	ns
Driver Enable to Output High	t_{ZH}	C_L = 100pF, S3 closed			2500	ns
Driver Enable to Output Low	t_{ZL}	C_L = 100pF, S2 closed			2500	ns
Driver Disable Time from Low	t_{LZ}	C_L = 15pF, S2 closed			100	ns
Driver Disable Time from High	t_{HZ}	C_L = 15pF, S3 closed			100	ns
Receiver Input to Output	t_{PLH}, t_{PHL}	R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF	20	60	200	ns
| t_{PLH} - t_{PHL} | Differential Receiver Skew	t_{SKD}	R_{DIFF} = 54Ω, C_{L1} = C_{L2} = 100pF			±30	ns
Receiver Enable to Output Low	t_{ZL}	C_{RL} = 15pF, S1 closed		20	50	ns
Receiver Enable to Output High	t_{ZH}	C_{RL} = 15pF, S2 closed		20	50	ns
Receiver Disable Time from Low	t_{LZ}	C_{RL} = 15pF, S1 closed		20	50	ns
Receiver Disable Time from High	t_{HZ}	C_{RL} = 15pF, S2 closed		20	50	ns
Maximum Data Rate	f_{MAX}			500		kbps
Time to Shutdown	t_{SHDN}	MAX481E (Note 5)	50		700	ns
Receiver Enable from Shutdown to Output High	$t_{ZH(SHDN)}$	C_L = 15pF, S2 closed			5500	ns
Receiver Enable from Shutdown to Output Low	$t_{ZL(SHDN)}$	C_L = 15pF, S1 closed			5500	ns

TABLEOF OPERATION

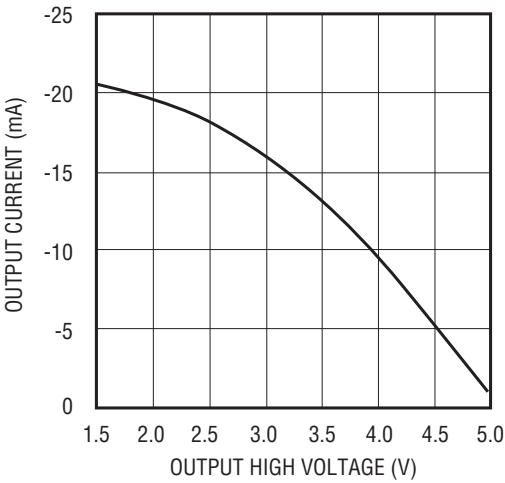| Transmission					Receipt			
Inputs			Outputs X		Inputs			Outputs
RE	DE	DI	A	B	RE	DE	A-B	RO
X	1	1	1	0	0	X	+0.2V	1
X	1	0	0	1	0	X	-0.2V	0
0	0	X	Z	Z	0	1	Inputs open	1
1	0	X	Z	Z	1	0	X	Z

X-Any level
Z-High resistance
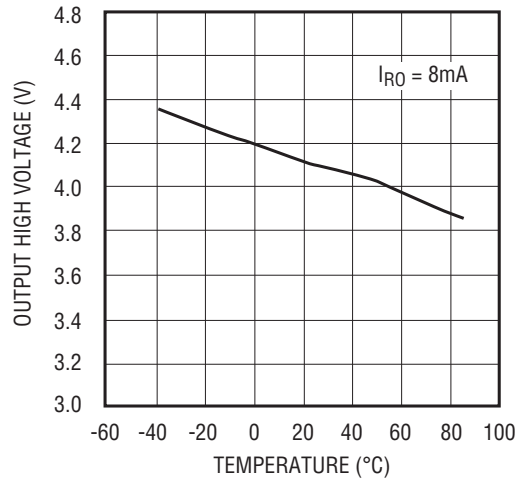
TYPICAL CHARACTERISTICS

OUTPUT CURRENT vs. RECEIVER OUTPUT LOW VOLTAGE
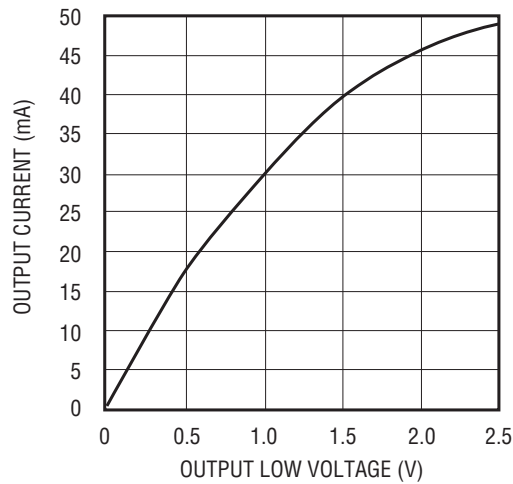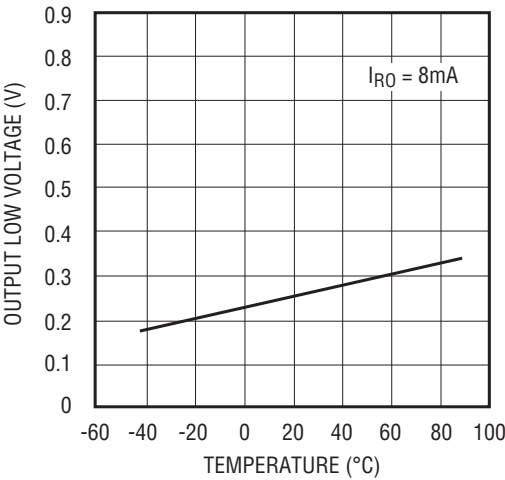
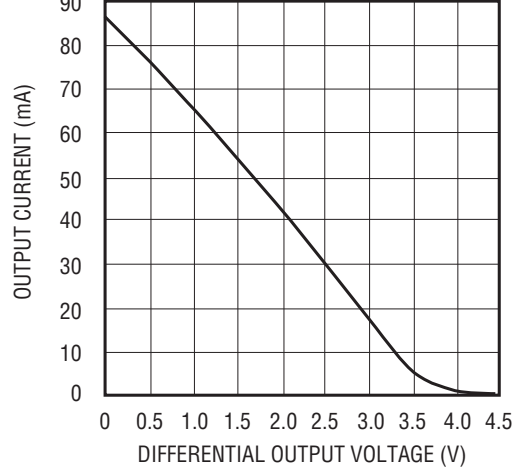### OUTPUT CURRENT vs. RECEIVER OUTPUT HIGH VOLTAGE

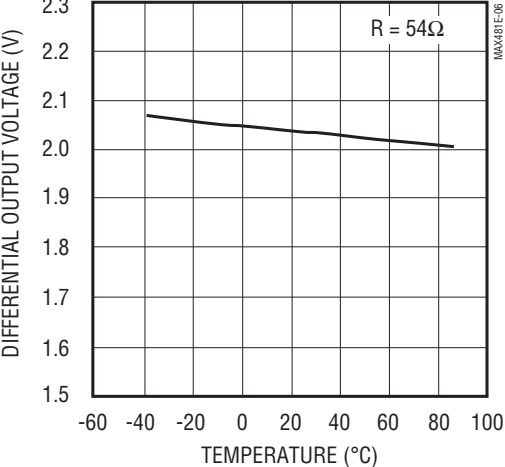### RECEIVER OUTPUT LOW VOLTAGE vs. TEMPERATURE
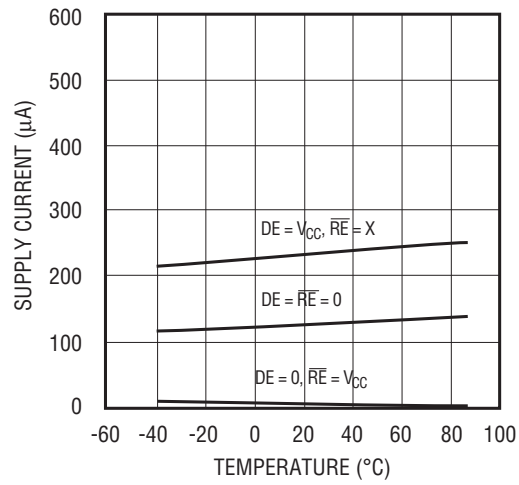
RECEIVER OUTPUT LOW VOLTAGE vs. TEMPERATURE

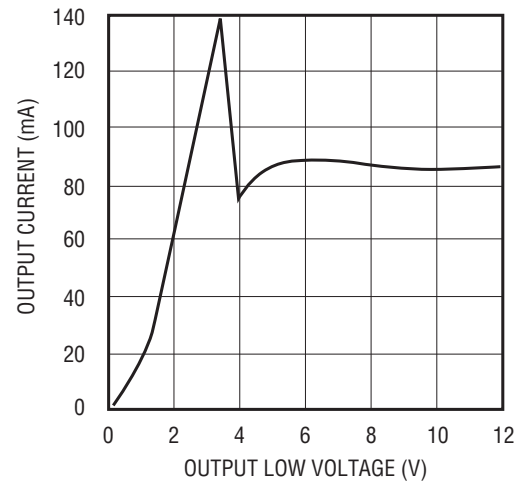### DRIVER OUTPUT CURRENT vs. DIFFERENTIAL OUTPUT VOLTAGE

DRIVER DIFFERENTIAL OUTPUT VOLTAGE vs. TEMPERATURE

SHUTDOWN CURRENT vs. TEMPERATURE

DE = V_{CC}, $\overline{RE}$ = X

DE = $\overline{RE}$ = 0

DE = 0, $\overline{RE}$ = V_{CC}

SUPPLY CURRENT (μA)

TEMPERATURE (°C)

OUTPUT CURRENT vs. DRIVER OUTPUT LOW VOLTAGE

OUTPUT CURRENT (mA)

OUTPUT LOW VOLTAGE (V)

OUTPUT CURRENT vs. DRIVER OUTPUT HIGH VOLTAGE

OUTPUT CURRENT (mA)

OUTPUT HIGH VOLTAGE (V)