DATASHEET

Half- and Full-Duplex RS-485 Transceivers
CE848XE-G Series

Features:

- Compliance Halogens Free
  (Br < 900 ppm, Cl < 900 ppm, Br+Cl < 1500 ppm)
- 5000Vrms Insulation voltage
- Logic side supply voltage (VDD1): 2.5V to 5.5V
- Bus side supply voltage (VDD2): 3V to 5.5V
- Data Rates:12Mbps or 14Mbps
- Failsafe receiver for bus open, short, and idle
- Operation temperature: -40°C to 125°C
- Wide-body SOIC-16 package
- Pin compatible to most isolated RS-485 transceivers

Description

The CE8485E is a Half-Duplex RS-485 Transceiver, while CE8486E is a Full-Duplex RS-485 Transceiver. Both devices are certified with 5kVrms isolation voltage per UL 1577.

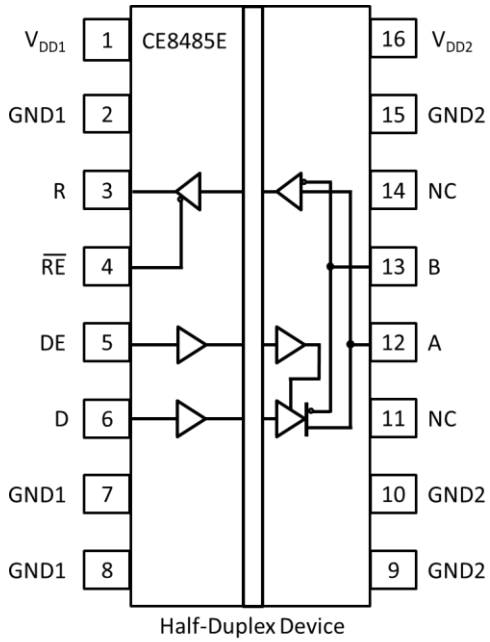
These devices are ideal for long transmission lines because the ground loop is broken to allow for a much larger common-mode voltage range.

These devices feature fail-safe circuitry, which guarantees a logic-high receiver output when the receiver inputs are open or shorted. The devices have a 1/8-unit-load receiver input impedance that allows up to 256 transceivers on the bus.

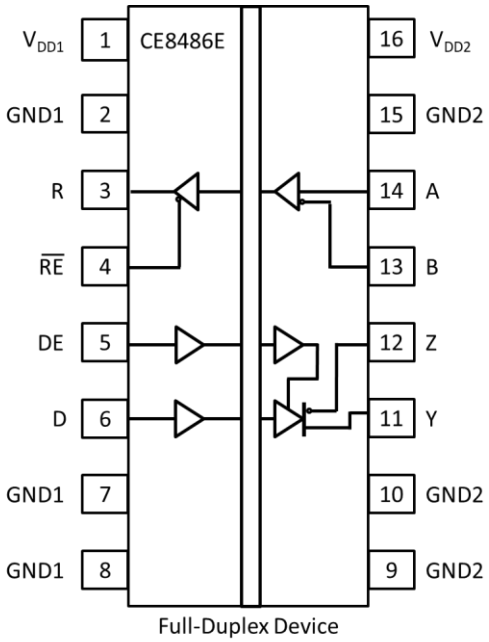
Applications

- Isolated RS-485 Communication
- Solar inverter
- Factory automation & control
- Motor drives
- HVAC systems and building automation

Pin Description



Half-Duplex Device



Full-Duplex Device

NAME	Pin		DESCRIPTION
	CE8485E	CE8486E	
V_{DD1}	1	1	Logic side power supply
GND1	2, 7, 8	2, 7, 8	Ground for V_{DD1}
R	3	3	Receiver output
$\overline{RE}$	4	4	Receiver enable. This pin disables the receiver output when high or open and enables the receiver output when low.
DE	5	5	Driver enable. This pin enables the driver output when high and disables the driver output when low or open.
D	6	6	Driver input
GND2	9, 10, 15	9, 10, 15	Ground for V_{DD2}
NC	11, 14	--	No Connection
Y	--	11	Receiver non-inverting input on the bus side
Z	--	12	Receiver inverting input on the bus side
A	12	--	Transceiver non-inverting input or output(I/O) on the bus side
	--	14	Driver non-inverting output
B	13	--	Transceiver inverting input or output(I/O) on the bus side
	--	13	Driver inverting output
V_{DD2}	16	16	Bus side supply voltage

Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Rating	Unit
Supply voltage	V_{DD1}	6	V
Supply voltage	V_{DD2}	6	V
Voltage on bus pins (A, B, Y, Z w.r.t GND2)	V_{BUS}	-7~12	V
Logic voltage level (D, DE, /RE, R)	V_I	V_{DD1}+0.5 *2	V
Output current on R pin	I_O	10	mA
Isolation Voltage	V_{ISO}	5000	V rms
Operating Temperature	T_{OPR}	-40 ~ +125	°C
Storage Temperature	T_{STG}	-55 ~ +150	°C

Notes:
*1 All voltage values except differential I/O bus voltages are with respect to the local ground terminal (GND1 or GND2) and are peak voltage values.
*2 Maximum voltage must not exceed 6 V
*3 Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only, which do not imply functional operation of the device at these or any other conditions beyond those indicated under Recommended Operating Conditions. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

Recommended Operating Conditions

Parameter		Symbol	Min	Max	Unit
Supply Voltage		V_{DD1}	2.5	5.5	V
Supply Voltage		V_{DD2}	3	5.5	V
High-level input voltage (D, DE, /RE inputs)		V_{IH}	0.7×V_{DD1}	V_{DD1}	V
Low-level input voltage (D, DE, /RE inputs)		V_{IL}	0	0.3×V_{DD1}	V
Differential input voltage, A with respect to B		V_{ID}	-12	12	V
Differential input resistance		R_L	54		Ω
Output current, Driver		I_O	-60	60	mA
Output current, Receiver		I_{OR}	-8	8	mA
Signaling rate	CE8485E	$1/t_{UI}$		14	Mbps
	CE8486E	$1/t_{UI}$		12	Mbps

Electrical Characteristics: Driver

V_{DD1} = 5V, V_{DD2} = 5 V, T_A=25°C, unless otherwise noted.

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Driver differential-output voltage magnitude	$\|V_{OD}\|$	3		V_{DD2}	V	Open circuit voltage, unloaded bus, $3V \leq V_{DD2} \leq 5.5V$
		1.5			V	R_L = 54Ω (Fig. 1)
		1.5			V	R_L = 100Ω (RS-422) (Fig. 1)
		1.5			V	$-7V \leq V_{test} \leq 12V$ (Fig. 1)
Change in differential output voltage between two states	$\Delta\|V_{OD}\|$	-0.2	0	0.2	V	R_L = 54Ω or R_L = 100Ω (Fig. 2)
Common-mode output voltage	V_{OC}			3	V	R_L = 54Ω or R_L = 100Ω (Fig. 2)
change in steady-state common-mode output voltage between two states	$\Delta V_{OC(SS)}$		0.2		V	R_L = 54Ω or R_L = 100Ω (Fig. 2)
Short-circuit output current	I_{OS}	-200		200	mA	V_A or V_B = -7V, Other input at 0 V
						V_A or V_B = 12 V, Other input at 0 V
Input current	I_I	-10		10	uA	V_D and V_{DE} = 0V or V_D and V_{DE} = V_{DD1}
Common-mode transient immunity	CMTI		100		kV/μs	Fig.8

Electrical Characteristics: Receiver

V_{DD1} = 5V, V_{DD2} = 5 V, T_A=25°C, unless otherwise noted.

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Receiver differential threshold voltage	V_{TH}		-100		mV	
Hysteresis voltage	V_{hys}		30		mV	
Output high voltage on the R pin	V_{OH}	V_{DD1}-0.4			V	V_{ID} = 200mV, I_O = -4mA
Output Low voltage on the R pin	V_{OL}			0.4	V	V_{ID} = -200mV, I_O = 4mA
Output high-impendance current on the R pin	$I_{O(Z)}$	-1		1	uA	V_R = 0 V or V_R = V_{DD1}, $V_{\overline{RE}}$ = V_{DD1}
Bus input current	I_{i1}		0.04	0.1	mA	V_A or V_B = 12V, Other input at 0V
			0.06	0.13	mA	V_A or V_B = 12V, V_{DD} = 0, Other input at 0V
		-0.1	-0.04		mA	V_A or V_B = -7V, Other input at 0V
		-0.05	-0.03		mA	V_A or V_B = -7V, V_{DD} = 0, Other input at 0V
Input Current on the $\overline{RE}$ pin	I_i	-10		10	uA	$V_{\overline{RE}}$ = 0V or $V_{\overline{RE}}$ = V_{DD1}

Differential input resistance	R_{ID}	96			kΩ	A, B
Common-mode transient immunity	CMTI		100		kV/μs	Fig.8

Supply Current

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Logic-side supply current	I_{DD1}			3.2	mA	$V_{\overline{RE}}$ = 0 V or V_{DD1}, DE = 0 V or V_{DD1} (V_{DD1}=3.3V)
				3.3	mA	$V_{\overline{RE}}$ = 0 V or V_{DD1}, DE = 0 V or V_{DD1} (V_{DD1}=5V)
Bus-side supply current	I_{DD2}			4.4	mA	$V_{\overline{RE}}$ = 0 V or V_{DD1}, DE = 0 V, No load

Switching Characteristics: Driver

V_{DD1} = 5V, V_{DD2} = 5 V, T_A=25°C, unless otherwise noted.

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Propagation delay	t_{PLH}, t_{PHL}		65		ns	Fig.3
Pulse skew ($\|t_{PHL} - t_{PLH}\|$)	PWD		3		ns	
Differential output signal rise and fall time	t_r, t_f		12		ns	
Enable time	t_{PZH}		65		ns	Fig.4
\Enable time	t_{PZL}		65		ns	Fig.5
Disable time	t_{PHZ}		65		ns	Fig.4
Disable time	t_{PLZ}		65		ns	Fig.5

Switching Characteristics: Receiver

V_{DD1} = 5V, V_{DD2} = 5 V, T_A=25°C, unless otherwise noted.

Parameter	Symbol	Min	Typ.	Max.	Unit	Condition
Propagation delay	t_{PLH}, t_{PHL}		80		ns	Fig.6
Pulse skew ($\|t_{PHL} - t_{PLH}\|$)	PWD		10		ns	Fig.6
Differential output signal rise and fall time	t_r, t_f		1		ns	Fig.6
Enable time	t_{PZH}		45		ns	Fig. 7
Enable time	t_{PZL}		45		ns	Fig. 7
Disable time	t_{PHZ}		60		ns	Fig. 7
Disable time	t_{PLZ}		45		ns	Fig. 7

Fig.1 Driver Voltages

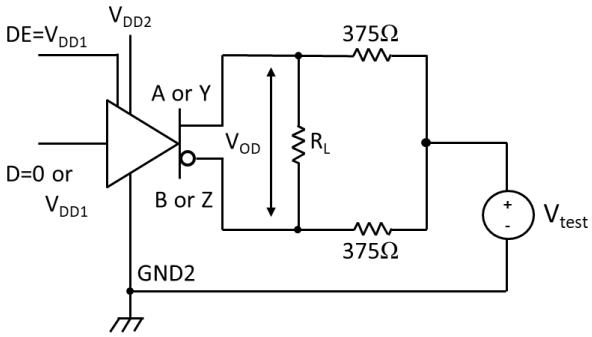
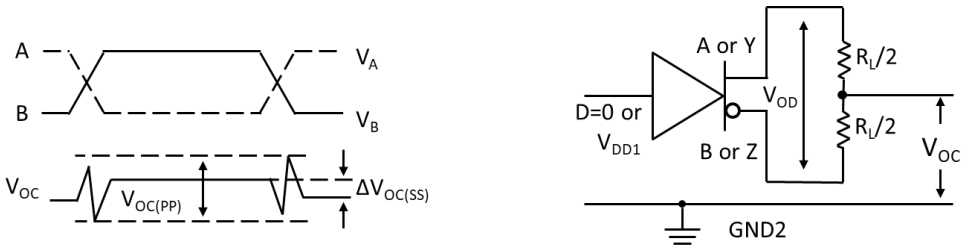
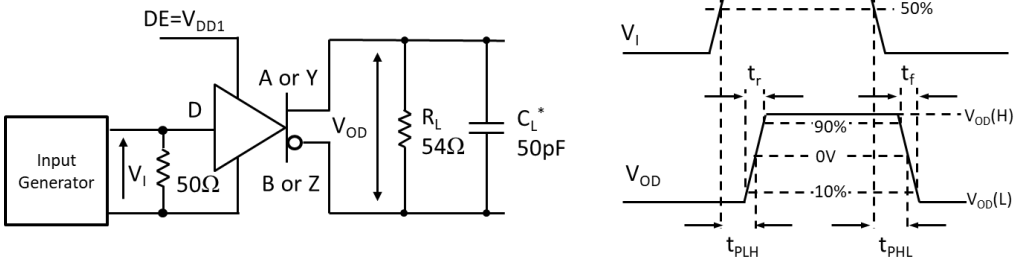


Fig.2 Driver Voltages



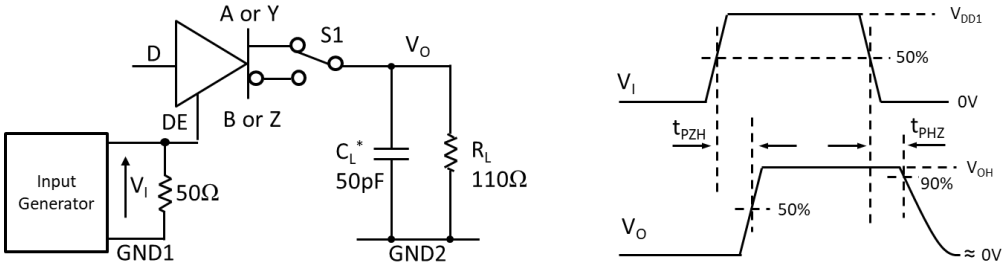
R_L = 100Ω for RS422, R_L = 54Ω for RS-485

Fig.3 Driver Switching Specifications



C_L includes fixture and instrumentation capacitance.

Fig.4 Driver Enable and Disable Times



C_L includes fixture and instrumentation capacitance.

Fig.5 Driver Enable and Disable Times

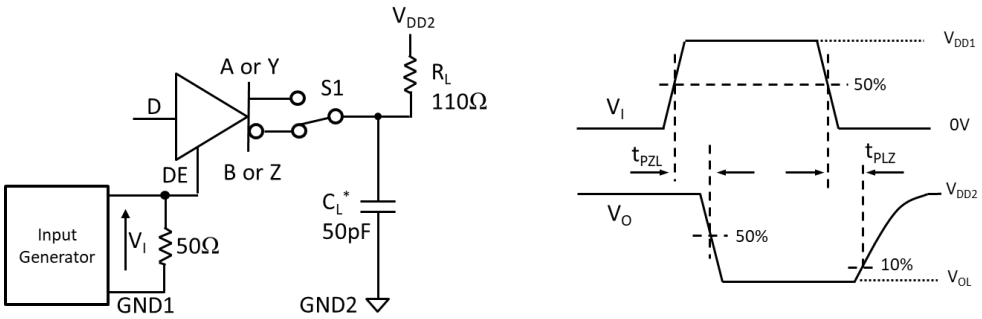


Fig.6 Receiver Switching Specifications

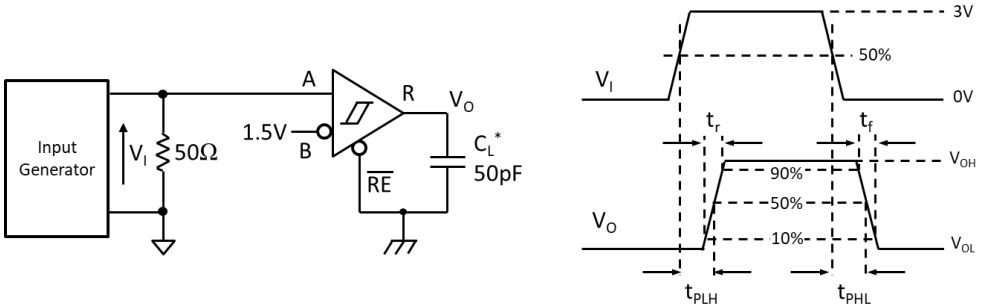


Figure 7. Receiver Enable and Disable Times

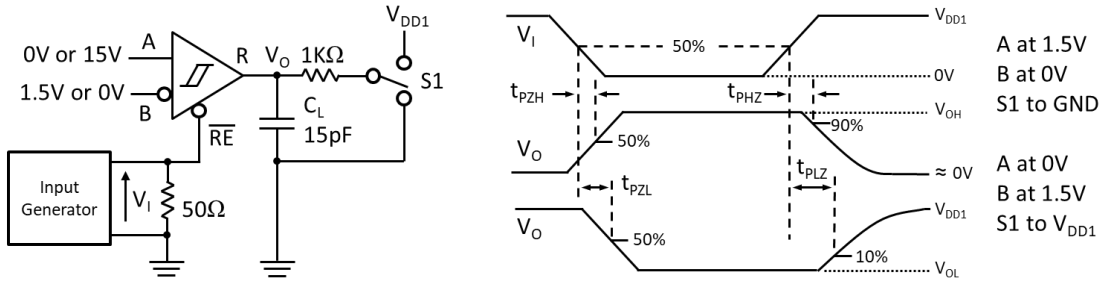
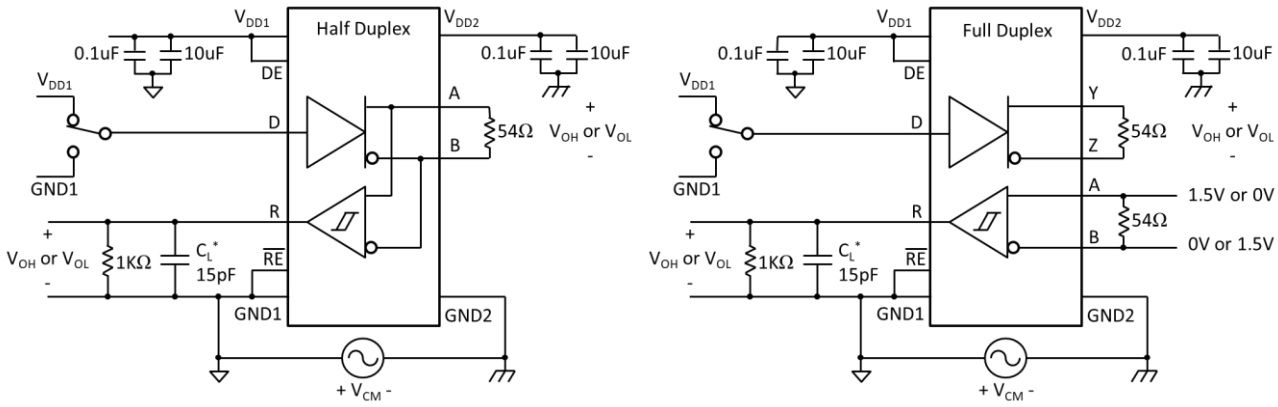


Figure 8. Common Mode Transient Immunity (CMTI)—Half Duplex and Full Duplex



C_L includes fixture and instrumentation capacitance.

Order Information

Part Number

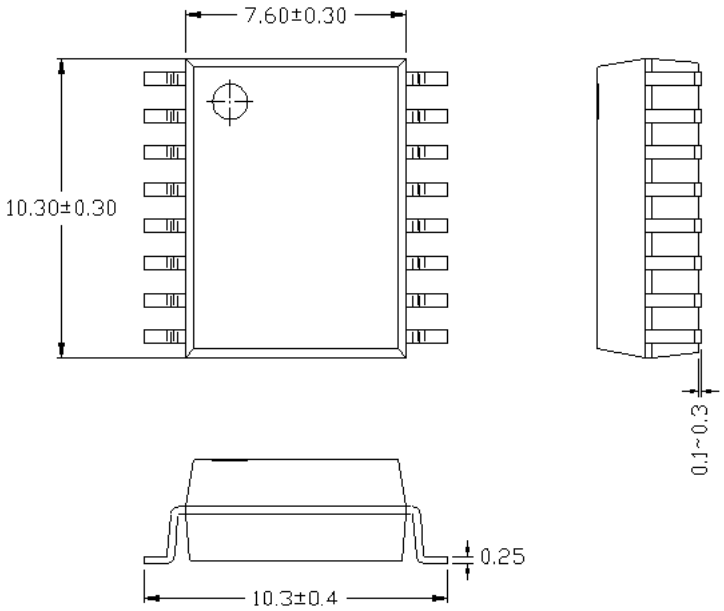
CE8485E(TA)-G
CE8486E(TA)-G

Note

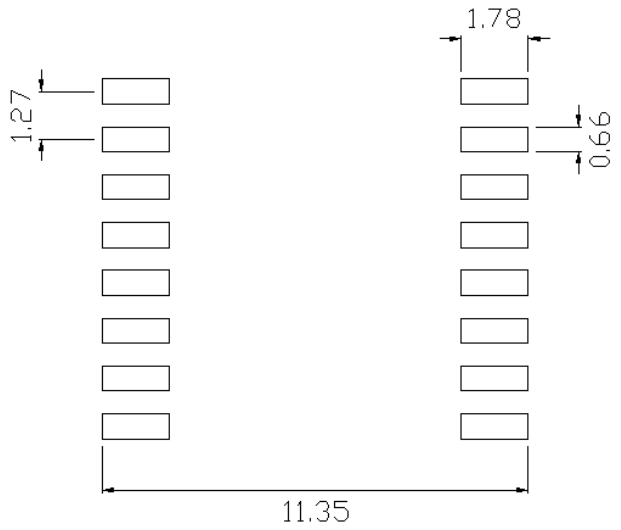
CE	=	denotes EVERLIGHT
8485E	=	part no.
8486E		
G	=	Halogens free

Option	Description	Packing quantity
(TA)	Surface mount lead form + TA tape & reel option	1500 units per reel

Package Dimension
(Dimensions in mm)

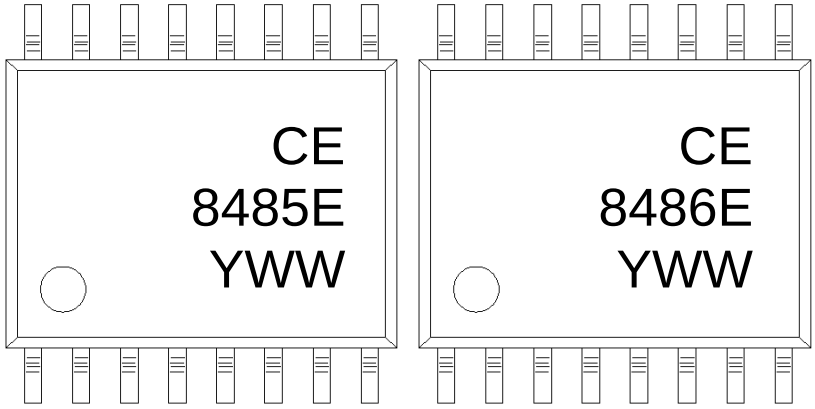


Recommended pad layout for surface mount leadform



Notes.
Suggested pad dimension is just for reference only.
Please modify the pad dimension based on individual need.

Device Marking



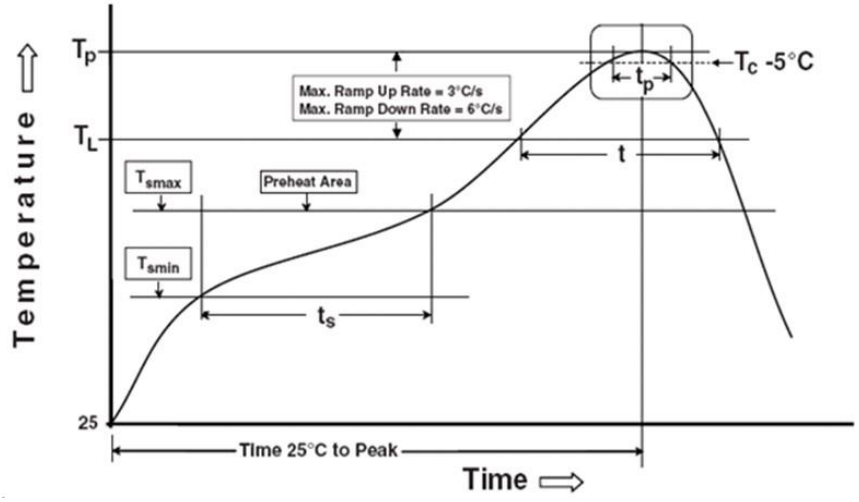
Notes

CE	denotes EVERLIGHT
8485E	denotes Device Number
8486E	
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code

Precautions for Use

1. Soldering Condition

1.1 (A) Maximum Body Case Temperature Profile for evaluation of Reflow Profile



Note: Reference: IPC/JEDEC J-STD-020D

Preheat	
Temperature min (T_{smin})	150 °C
Temperature max (T_{smax})	200°C
Time (T_{smin} to T_{smax}) (t_s)	60-120 seconds
Average ramp-up rate (T_{smax} to T_p)	3 °C/second max
Other	
Liquidus Temperature (T_L)	217 °C
Time above Liquidus Temperature (t_L)	60-100 sec
Peak Temperature (T_P)	260°C
Time within 5 °C of Actual Peak Temperature: T_P -5°C	30 s
Ramp- Down Rate from Peak Temperature	6°C /second max.
Time 25°C to peak temperature	8 minutes max.
Reflow times	3 times

DISCLAIMER

1. Above specification may be changed without notice. EVERLIGHT will reserve authority on material change for above specification.
2. The graphs shown in this datasheet are representing typical data only and do not show guaranteed values.
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