



## ICPL2530, ICPL2531

### DESCRIPTION

The ICPL2530 and ICPL2531 dual channel devices each consists of an infrared emitting diode, optically coupled to a high speed photo detector transistor. A separate connection for the photodiode bias and output transistor collector increases the speed by several orders of magnitude over conventional phototransistor couplers by reducing the base-collector capacitance.

### FEATURES

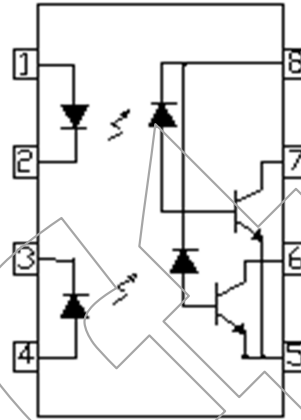
- High Speed 1Mbit/s
- High AC Isolation Voltage 5000V<sub>RMS</sub>
- Guaranteed Performance from 0°C to 70°C
- Wide Operating Temperature Range -40°C to 100 °C
- Pb Free and RoHS Compliant
- Safety Approvals Pending

### APPLICATIONS

- Line Receivers
- Telecommunication Equipment
- Power Transistor Isolation in Motor Drives
- Replacement of Low Speed Phototransistor Optocouplers
- High Speed Logic Ground Isolation

### ORDER INFORMATION

- Add G after PN for 10mm lead spacing
- Add SM after PN for Surface Mount,
- Add SMT&R after PN for Surface Mount Tape & Reel



1. Anode
2. Cathode
3. Cathode
4. Anode
5. Gnd
6. Vout2
7. Vout1
8. Vcc

### ABSOLUTE MAXIMUM RATINGS

#### Input Diode

Forward Current	25mA
Peak Forward Current (50% duty cycle 1ms pulse width)	50mA
Peak Transient Current (≤ 1μs pulse width, 300pps)	1A
Reverse Voltage	5V
Power dissipation	45mW

#### Output

Average Output Current	8mA
Peak Output Current	16mA
Output Voltage	-0.5 to 20V
Supply Voltage	-0.5 to 30V
Power Dissipation	35mW

#### Total Package

Isolation Voltage	5000V <sub>RMS</sub>
Operating Temperature	-40 to 100 °C
Storage Temperature	-55 to 125 °C
Lead Soldering Temperature (10s)	260°C

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**ICPL2530, ICPL2531**

**ELECTRICAL CHARACTERISTICS**

**INPUT ( $T_A = 0^\circ\text{C}$  to  $70^\circ\text{C}$  unless otherwise specified)**

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Forward Voltage	$V_F$	$I_F = 16\text{mA}$ $T_A = 25^\circ\text{C}$		1.45	1.8	V
Reverse Voltage	$V_R$	$I_R = 10\mu\text{A}$	5.0			V
Temperature Coefficient	$V_F/T_A$	$I_F = 16\text{mA}$		-1.9		mV/°C
Input Capacitance	$C_{IN}$	$V_F = 0\text{V}$ , $f = 1\text{MHz}$		60		pF

**OUTPUT ( $T_A = 0^\circ\text{C}$  to  $70^\circ\text{C}$  unless otherwise specified)**

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Logic High Output Current	$I_{OH}$	$I_F = 0\text{mA}$ , $V_O = V_{CC} = 5.5\text{V}$ , $T_A = 25^\circ\text{C}$		0.001	0.5	$\mu\text{A}$
		$I_F = 0\text{mA}$ , $V_O = V_{CC} = 15\text{V}$ , $T_A = 25^\circ\text{C}$			50	
Logic Low Supply Current	$I_{CCL}$	$I_{F1} = I_{F2} = 16\text{mA}$ , $V_O = \text{Open}$ , $V_{CC} = 15\text{V}$ ,		140	400	$\mu\text{A}$
Logic High Supply Current	$I_{CCH}$	$I_F = 0\text{mA}$ , $V_O = \text{Open}$ $V_{CC} = 15\text{V}$ , $T_A = 25^\circ\text{C}$		0.01	1	$\mu\text{A}$
		$I_F = 0\text{mA}$ , $V_O = \text{Open}$ $V_{CC} = 15\text{V}$			4	

\* Typical Values at  $T_A = 25^\circ\text{C}$



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**ELECTRICAL CHARACTERISTICS**

**COUPLED** ( $T_A = 0^\circ\text{C}$  to  $70^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Current Transfer Ratio	CTR	ICPL2530 ICPL2531 $I_F = 16\text{mA}$ , $V_O = 0.4\text{V}$ $V_{CC} = 4.5\text{V}$ , $T_A = 25^\circ\text{C}$	7 19		50 50	%
		ICPL2530 ICPL2531 $I_F = 16\text{mA}$ , $V_O = 0.5\text{V}$ $V_{CC} = 4.5\text{V}$	5 15			%
Logic Low Output Voltage	$V_{OL}$	ICPL2530 $I_F = 16\text{mA}$ , $I_O = 1.1\text{mA}$ $V_{CC} = 4.5\text{V}$ , $T_A = 25^\circ\text{C}$		0.18	0.5	V
		ICPL2531 $I_F = 16\text{mA}$ , $I_O = 3\text{mA}$ $V_{CC} = 4.5\text{V}$ , $T_A = 25^\circ\text{C}$		0.25	0.5	V
		ICPL2530 $I_F = 16\text{mA}$ , $I_O = 0.8\text{mA}$ $V_{CC} = 4.5\text{V}$			0.5	V
		ICPL2531 $I_F = 16\text{mA}$ , $I_O = 2.4\text{mA}$ $V_{CC} = 4.5\text{V}$			0.5	V

\* Typical Values at  $T_A = 25^\circ\text{C}$



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**ELECTRICAL CHARACTERISTICS**

**Switching Characteristics**

( $T_A = 0^\circ\text{C}$  to  $70^\circ\text{C}$ ,  $V_{CC} = 5\text{V}$ ,  $I_F = 16\text{mA}$ , unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Propagation Delay Time to Logic Low	$t_{PHL}$	ICPL2530 $R_L = 4.1\text{k}\Omega$ , $T_A = 25^\circ\text{C}$ $R_L = 4.1\text{k}\Omega$		0.35	1.5 2.0	$\mu\text{s}$
		ICPL2531 $R_L = 1.9\text{k}\Omega$ , $T_A = 25^\circ\text{C}$ $R_L = 1.9\text{k}\Omega$		0.35	0.8 1.0	
Propagation Delay Time to Logic High	$t_{PLH}$	ICPL2530 $R_L = 4.1\text{k}\Omega$ , $T_A = 25^\circ\text{C}$ $R_L = 4.1\text{k}\Omega$		0.5	1.5 2.0	$\mu\text{s}$
		ICPL2531 $R_L = 1.9\text{k}\Omega$ , $T_A = 25^\circ\text{C}$ $R_L = 1.9\text{k}\Omega$		0.3	0.8 1.0	
Common Mode Transient Immunity at Logic High	$CM_H$	ICPL2530 $I_F = 0\text{mA}$ , $V_{CM} = 10\text{Vp-p}$ , $R_L = 4.1\text{k}\Omega$ , $T_A = 25^\circ\text{C}$	1000	10000		$\text{V}/\mu\text{s}$
		ICPL2531 $I_F = 0\text{mA}$ , $V_{CM} = 1000\text{Vp-p}$ , $R_L = 1.9\text{k}\Omega$ , $T_A = 25^\circ\text{C}$	1000	10000		$\text{V}/\mu\text{s}$
Common Mode Transient Immunity at Logic Low	$CM_L$	ICPL2530 $I_F = 16\text{mA}$ , $V_{CM} = 10\text{Vp-p}$ , $R_L = 4.1\text{k}\Omega$ , $T_A = 25^\circ\text{C}$	1000	10000		$\text{V}/\mu\text{s}$
		ICPL2531 $I_F = 16\text{mA}$ , $V_{CM} = 1000\text{Vp-p}$ , $R_L = 1.9\text{k}\Omega$ , $T_A = 25^\circ\text{C}$	1000	10000		$\text{V}/\mu\text{s}$

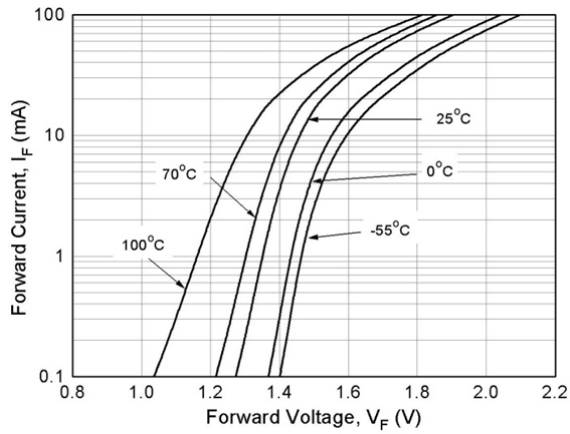
**\* Typical Values at  $T_A = 25^\circ\text{C}$**

Common mode transient immunity in logic high level is the maximum tolerable (positive)  $dV_{CM}/dt$  on the leading edge of the common mode pulse signal  $V_{CM}$ , to assure that the output will remain in a logic high state (i.e.  $V_O > 2.0\text{V}$ ).

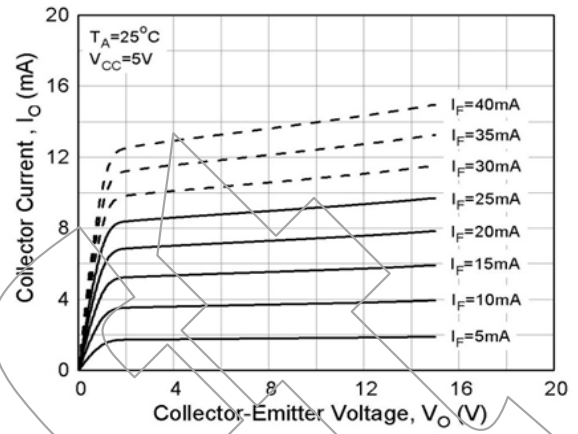
Common mode transient immunity in logic low level is the maximum tolerable (negative)  $dV_{CM}/dt$  on the trailing edge of the common mode pulse signal,  $V_{CM}$ , to assure that the output will remain in a logic low state (i.e.  $V_O < 0.8\text{V}$ ).



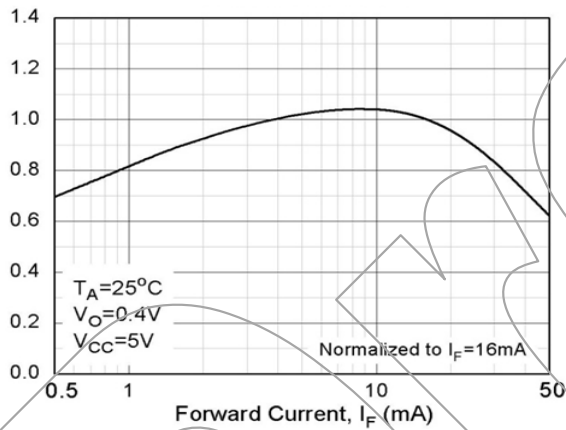
**ICPL2530, ICPL2531**



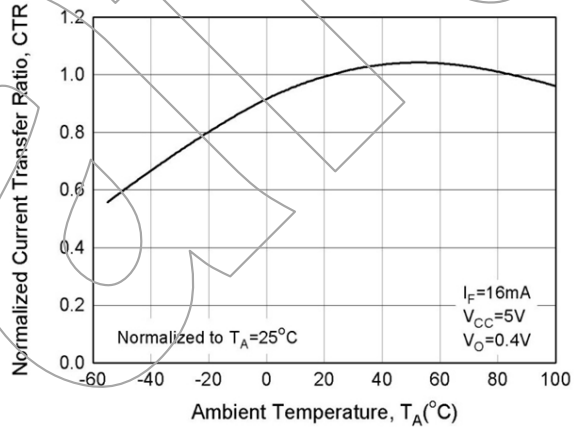
**Fig 1 Forward Current vs Forward Voltage**



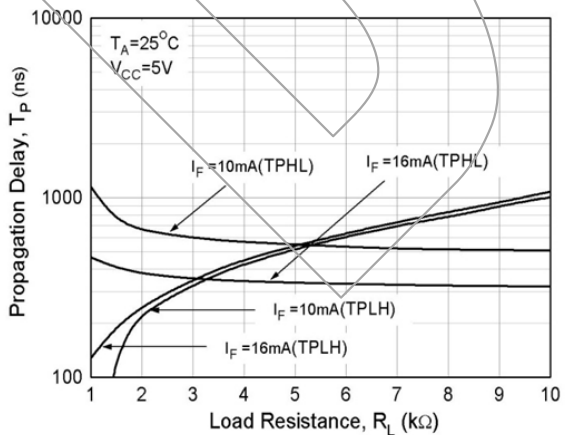
**Fig 2 Output Current vs Output Voltage**



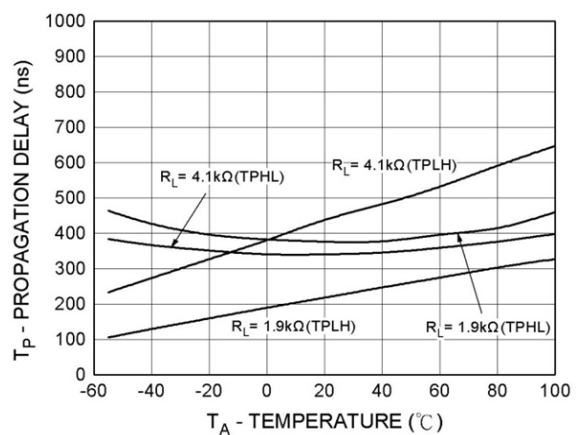
**Fig 3 Normalized CTR vs Forward Current**



**Fig 4 Normalized CTR vs Ambient Temperature**



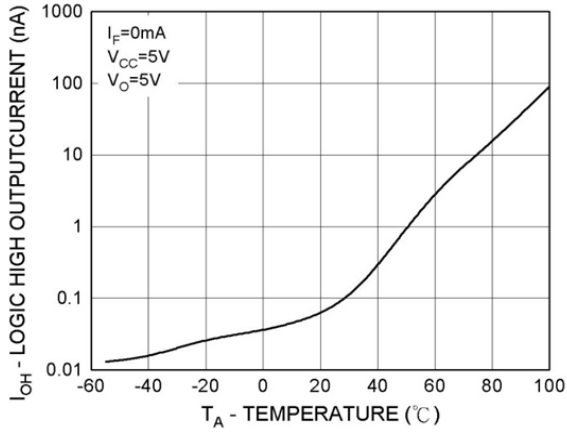
**Fig 5 Propagation Delay vs Load Resistance**



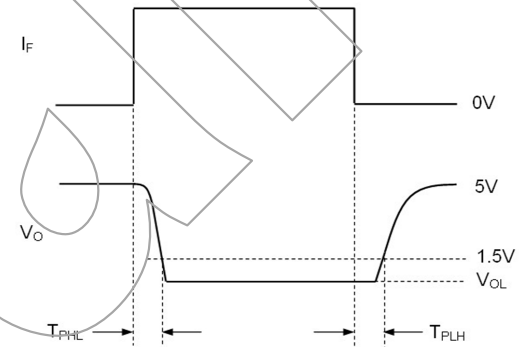
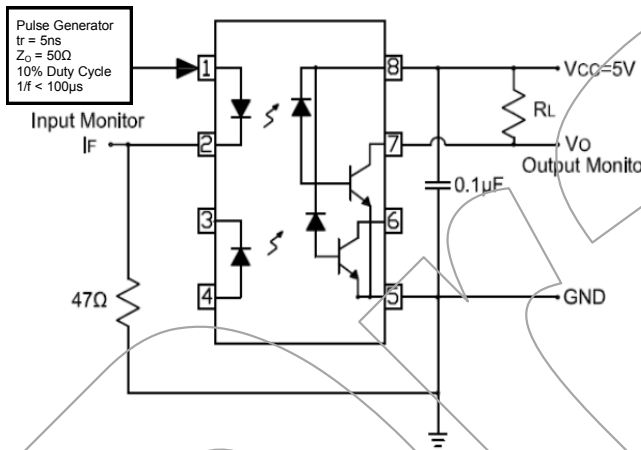
**Fig 6 Propagation Delay vs Ambient Temperature**



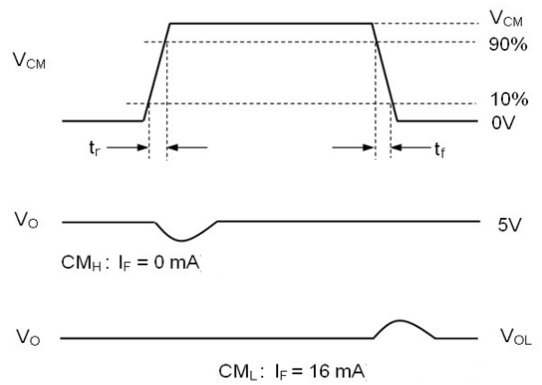
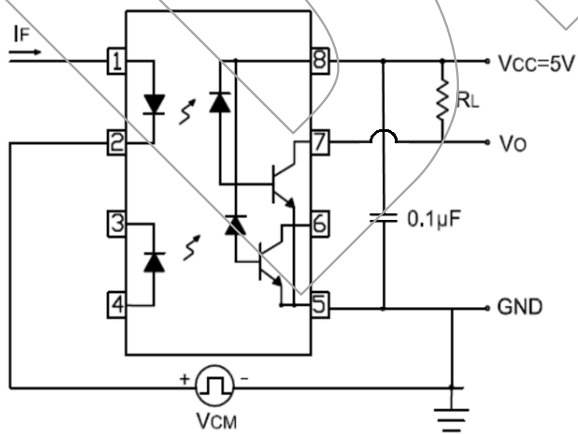
## ICPL2530, ICPL2531



**Fig 7 Logic High Output Current vs  $T_A$**



**Fig 8 Switching Time Test Circuit**



**Fig 9 Transient Immunity Test Circuit**



## ICPL2530, ICPL2531

### ORDER INFORMATION

ICPL2530			
After PN	PN	Description	Packing quantity
None	ICPL2530	Standard DIP8	45 pcs per tube
G	ICPL2530G	10mm Lead Spacing	45 pcs per tube
SM	ICPL2530SM	Surface Mount	45 pcs per tube
SMT&R	ICPL2530SMT&R	Surface Mount Tape & Reel	1000 pcs per reel

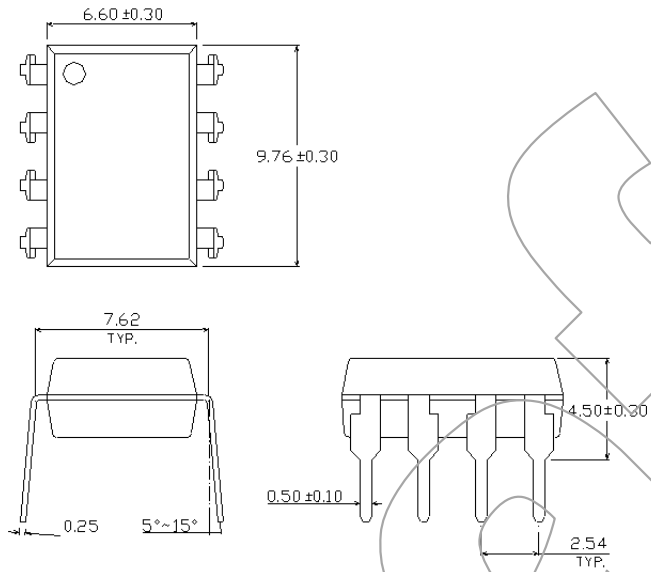
ICPL2531			
After PN	PN	Description	Packing quantity
None	ICPL2531	Standard DIP8	45 pcs per tube
G	ICPL2531G	10mm Lead Spacing	45 pcs per tube
SM	ICPL2531SM	Surface Mount	50 pcs per tube
SMT&R	ICPL2531SMT&R	Surface Mount Tape & Reel	1000 pcs per reel



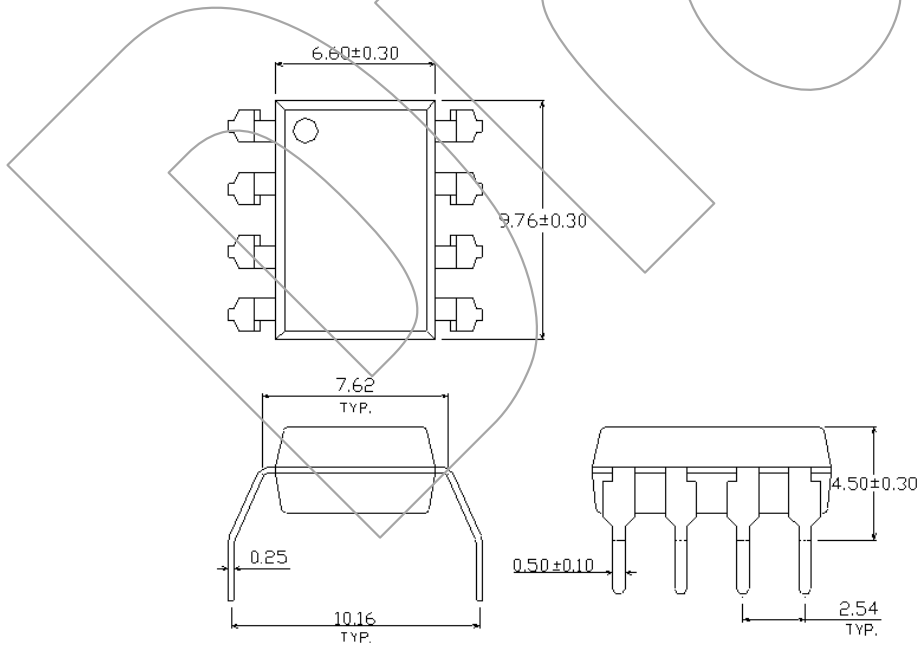
**ICPL2530, ICPL2531**

**PACKAGE DIMENSIONS (mm)**

**DIP**



**G FORM**

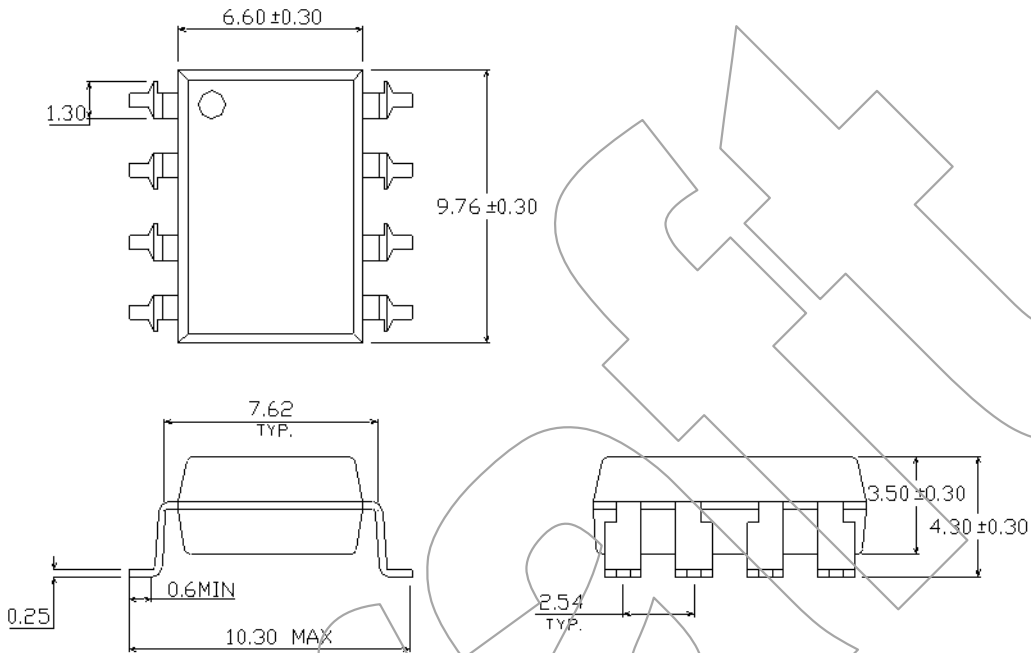






**ICPL2530, ICPL2531**

**SMD**



**REFLOW SOLDERING TEMPERATURE PROFILE**

