



ISOCOM
COMPONENTS

6N135, 6N136, ICPL4502, ICPL4503

DESCRIPTION

The 6N135, 6N136, ICPL4502 and ICPL4503 devices each consist 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 increase the speed by several orders of magnitude over conventional phototransistor couplers by reducing the base-collector capacitance of the input transistor.

FEATURES

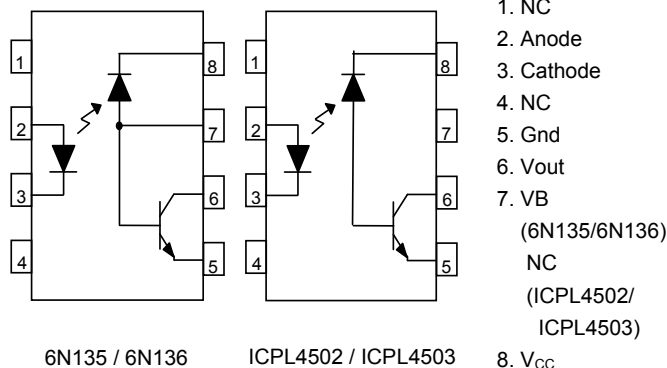
- High speed 1Mbit/s
- High AC Isolation Voltage 5000V_{rms}
- Guaranteed performance from 0°C to 70°C
- Wide Operating temperature range -55°C to 100°C
- Pb Free and RoHS Compliant
- Safety Approvals Pending

APPLICATIONS

- Line Receivers
- Telecommunication Equipments
- Power Transistor Isolation in Motor Drives
- Replacement of Low Speed Phototransistor Optocouplers
- Feedback Loop in Switch Mode Power Supplies
- High Speed Logic Ground Isolation
- Home Appliances

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



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

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

Output Current	8mA
Peak Output Current	16mA
Emitter-Base Reverse Voltage (6N135 and 6N136 only)	5V
Base Current (6N135 and 6N136 only)	5mA
Output Voltage	-0.5 to 20V
Supply Voltage	-0.5 to 30V
Power Dissipation	100mW

Total Package

Isolation Voltage	5000V _{rms}
Operating Temperature	-55 to 100 °C
Storage Temperature	-55 to 125 °C
Lead Soldering Temperature (10s)	260°C

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6N135, 6N136, ICPL4502, ICPL4503

ELECTRICAL CHARACTERISTICS ($T_A = 0^\circ\text{C}$ to 70°C unless otherwise specified)

INPUT

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Forward Voltage	V_F	$I_F = 16\text{mA}$		1.45	1.8	V
Reverse Voltage	V_R	$I_R = 10\mu\text{A}$	5.0			V
Temperature Coefficient of V_F	$\Delta V_F / \Delta T_A$	$I_F = 16\text{mA}$		-1.9		mV/°C

OUTPUT

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	μA
		$I_F = 0\text{mA}$, $V_O = V_{CC} = 15\text{V}$, $T_A = 25^\circ\text{C}$		0.01	1	
		$I_F = 0\text{mA}$, $V_O = V_{CC} = 15\text{V}$			50	
Logic Low Supply Current	I_{CCL}	$I_F = 16\text{mA}$, $V_O = \text{Open}$, $V_{CC} = 15\text{V}$		140	200	μA
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	μA
		$I_F = 0\text{mA}$, $V_O = \text{Open}$, $V_{CC} = 15\text{V}$			2	

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



6N135, 6N136, ICPL4502, ICPL4503

ELECTRICAL CHARACTERISTICS ($T_A = 0^\circ\text{C}$ to 70°C unless otherwise specified)

COUPLED

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Current Transfer Ratio	CTR	6N135 6N136 / ICPL4502 / ICPL4503 $I_F = 16\text{mA}$, $V_O = 0.4\text{V}$ $V_{CC} = 4.5\text{V}$, $T_A = 25^\circ\text{C}$	7 19		50 50	%
		6N135 6N136 / ICPL4502 / ICPL4503 $I_F = 16\text{mA}$, $V_O = 0.5\text{V}$ $V_{CC} = 4.5\text{V}$	5 15			
Logic Low Output Voltage	V_{OL}	6N135 $I_F = 16\text{mA}$, $I_O = 1.1\text{mA}$, $V_{CC} = 4.5\text{V}$, $T_A = 25^\circ\text{C}$		0.18	0.4	V
		6N136 / ICPL4502 / ICPL4503 $I_F = 16\text{mA}$, $I_O = 3\text{mA}$, $V_{CC} = 4.5\text{V}$, $T_A = 25^\circ\text{C}$		0.25	0.4	
		6N135 $I_F = 16\text{mA}$, $I_O = 0.8\text{mA}$, $V_{CC} = 4.5\text{V}$			0.5	
		6N136 / ICPL4502 / ICPL4503 $I_F = 16\text{mA}$, $I_O = 2.4\text{mA}$, $V_{CC} = 4.5\text{V}$			0.5	

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



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ELECTRICAL CHARACTERISTICS ($T_A = 0^\circ\text{C}$ to 70°C unless otherwise specified)

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

Parameter	Symbol	Test Condition	Min	Typ.*	Max	Unit
Propagation Delay Time to Logic Low	T_{PHL}	6N135 $R_L = 4.1\text{k}\Omega$, $T_A = 25^\circ\text{C}$ $R_L = 4.1\text{k}\Omega$		0.35	1.5 2.0	μs
		6N136 / ICPL4502 / ICPL4503 $R_L = 1.9\text{k}\Omega$, $T_A = 25^\circ\text{C}$ $R_L = 1.9\text{k}\Omega$		0.35	0.8 1.0	
Propagation Delay Time to Logic High	T_{PLH}	6N135 $R_L = 4.1\text{k}\Omega$, $T_A = 25^\circ\text{C}$ $R_L = 4.1\text{k}\Omega$		0.5	1.5 2.0	μs
		6N136 / ICPL4502 / ICPL4503 $R_L = 1.9\text{k}\Omega$, $T_A = 25^\circ\text{C}$ $R_L = 1.9\text{k}\Omega$			0.8 1.0	
Common Mode Transient Immunity at Logic High	CM_H	6N135 $I_F = 0\text{mA}$, $V_{CM} = 10\text{Vp-p}$, $R_L = 4.1\text{k}\Omega$, $T_A = 25^\circ\text{C}$	1000			$\text{V}/\mu\text{s}$
		6N136 / ICPL4502 $I_F = 0\text{mA}$, $V_{CM} = 10\text{Vp-p}$, $R_L = 1.9\text{k}\Omega$, $T_A = 25^\circ\text{C}$	1000			
		ICPL4503 $I_F = 0\text{mA}$, $V_{CM} = 1500\text{Vp-p}$, $R_L = 1.9\text{k}\Omega$, $T_A = 25^\circ\text{C}$	15000	20000		
Common Mode Transient Immunity at Logic Low	CM_L	6N135 $I_F = 16\text{mA}$, $V_{CM} = 10\text{Vp-p}$, $R_L = 4.1\text{k}\Omega$, $T_A = 25^\circ\text{C}$	1000			$\text{V}/\mu\text{s}$
		6N136 / ICPL4502 $I_F = 16\text{mA}$, $V_{CM} = 10\text{Vp-p}$, $R_L = 1.9\text{k}\Omega$, $T_A = 25^\circ\text{C}$	1000			
		ICPL4503 $I_F = 16\text{mA}$, $V_{CM} = 1500\text{Vp-p}$, $R_L = 1.9\text{k}\Omega$, $T_A = 25^\circ\text{C}$	15000	20000		

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



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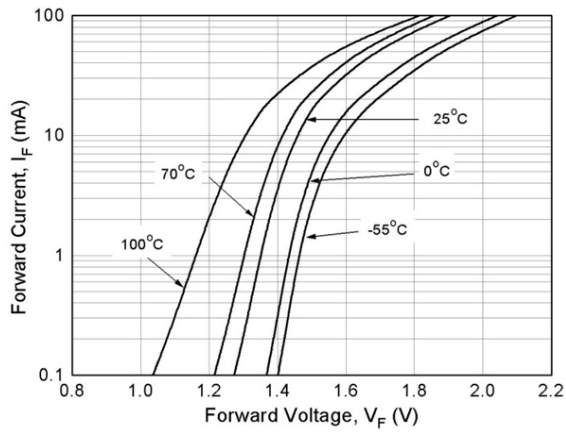


Fig 1 Forward Current vs Forward Voltage

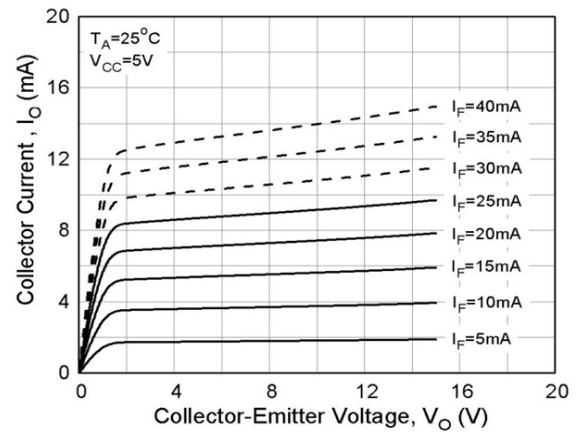


Fig 2 Output Current vs Output Voltage

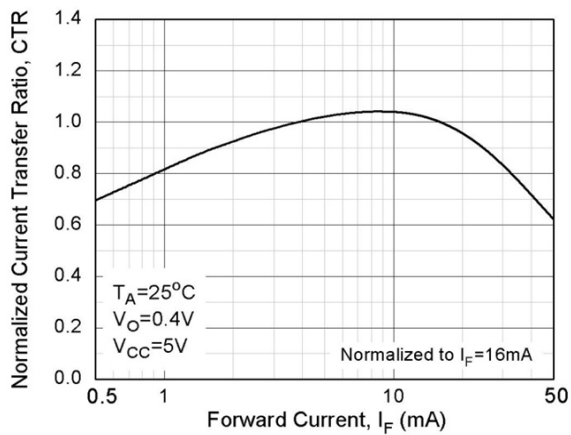


Fig 3 Normalized CTR vs Forward Current

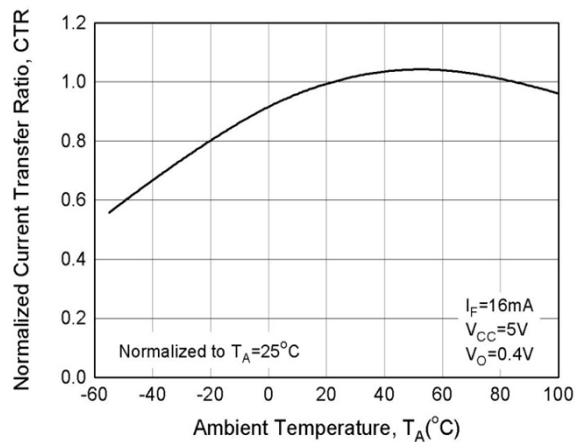


Fig 4 Normalized CTR vs T_A

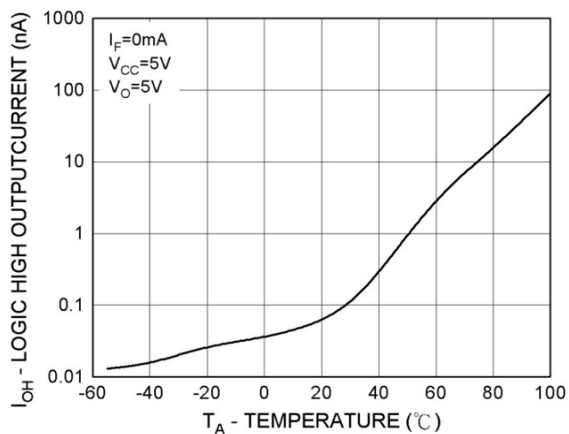


Fig 5 Logic High Output Current vs T_A

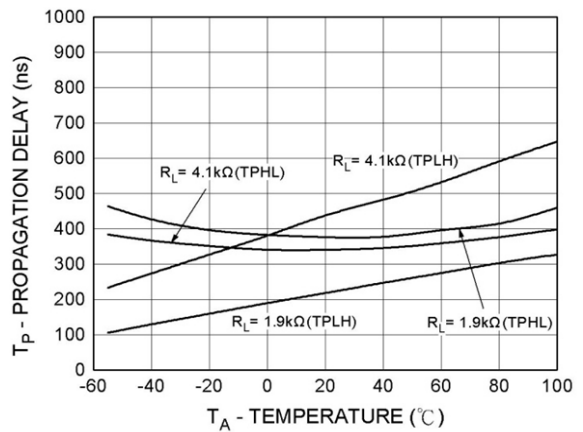


Fig 6 Propagation Delay vs T_A



6N135, 6N136, ICPL4502, ICPL4503

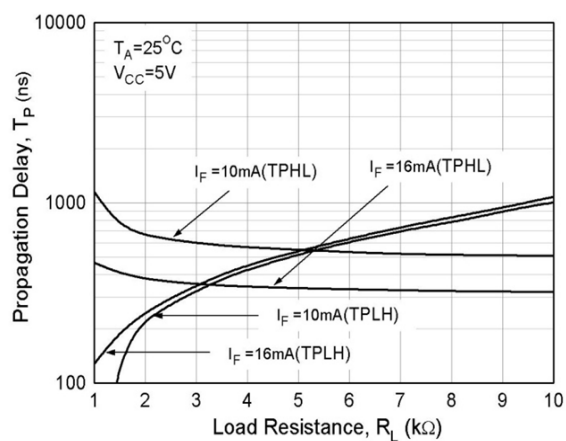
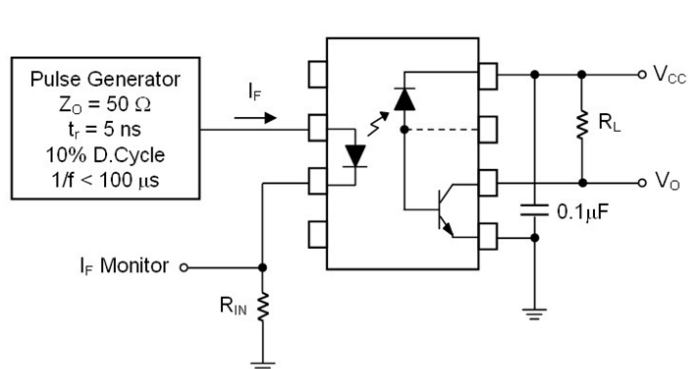
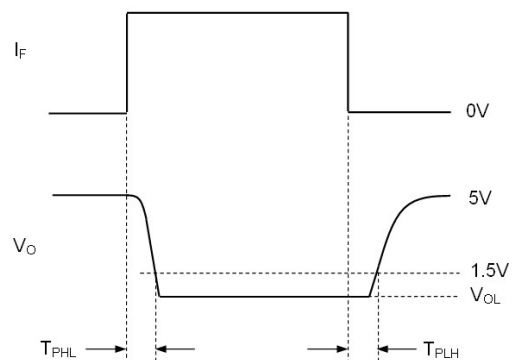


Fig 7 Propagation Delay vs Load Resistance

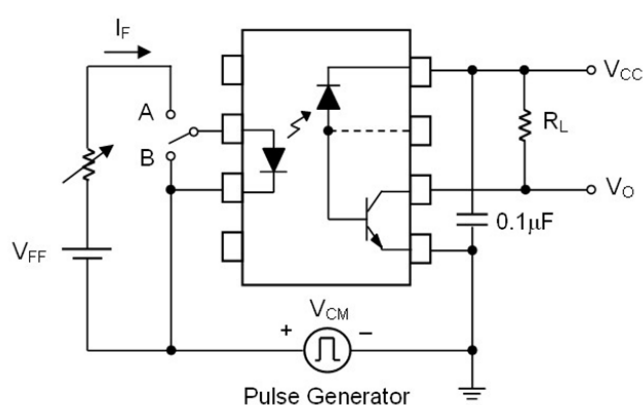


Switching Time Test Circuit

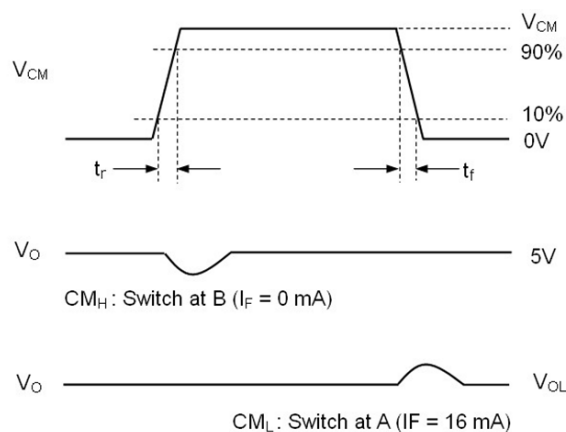




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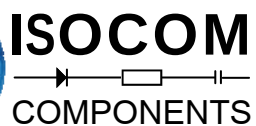
Common Mode Transient Immunity Test Circuit



Note:

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., $V_O > 2.0V$).

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., $V_O < 0.8V$).



ORDER INFORMATION

6N135, 6N136, ICPL4502, ICPL4503			
After PN	PN	Description	Packing quantity
None	6N135, 6N136, ICPL4502, ICPL4503	Standard Dip8	45 pcs per tube
G	6N135G, 6N136G, ICPL4502G, ICPL4503G	10mm Lead Spacing	45 pcs per tube
SM	6N135SM, 6N136SM, ICPL4502SM, ICPL4503SM	Surface Mount	45 pcs per reel
SMT&R	6N135SMT&R, 6N136SMT&R, ICPL4502SMT&R, ICPL4503SMT&R	Surface Mount Tape & Reel	1000 pcs per reel

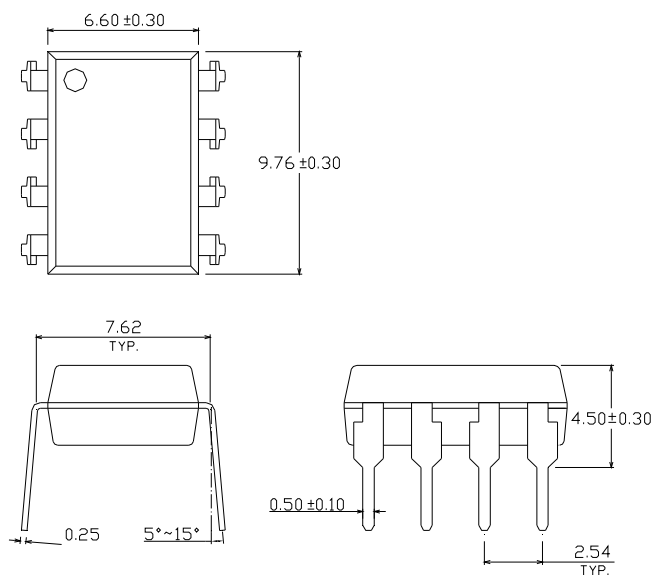


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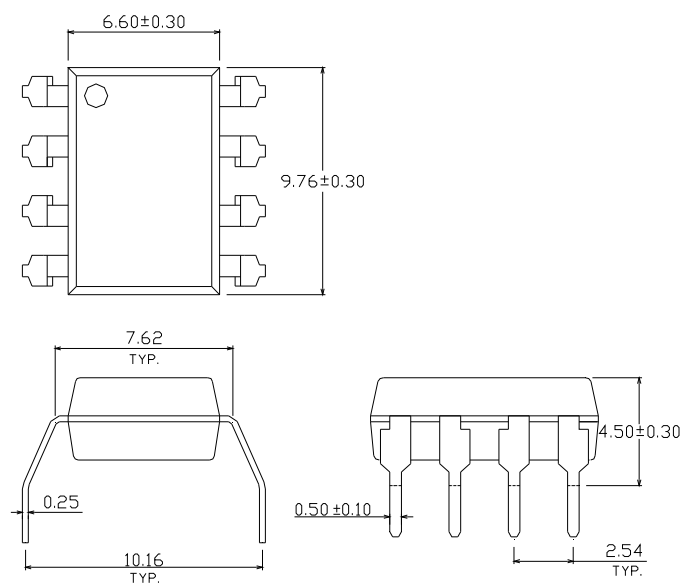
6N135, 6N136, ICPL4502, ICPL4503

PACKAGE DIMENSIONS (mm)

DIP



G FORM



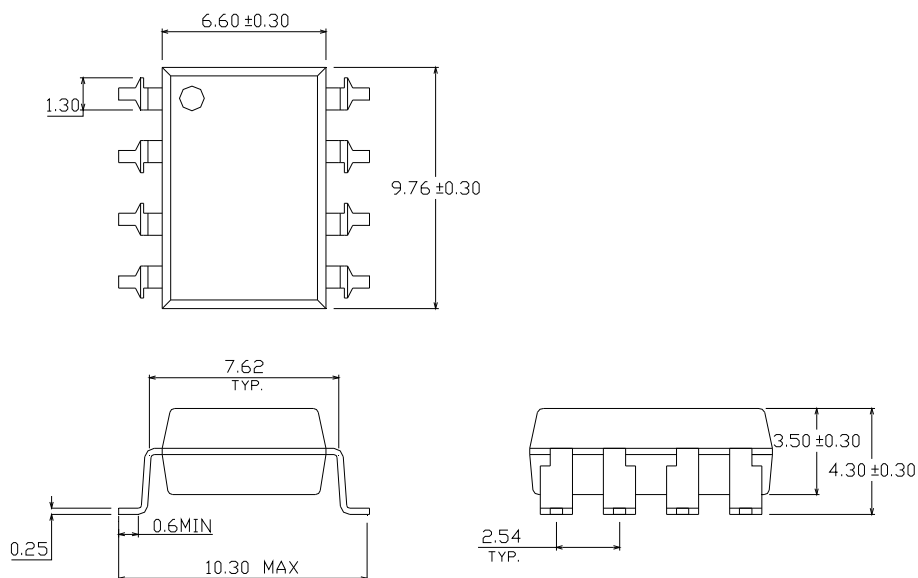


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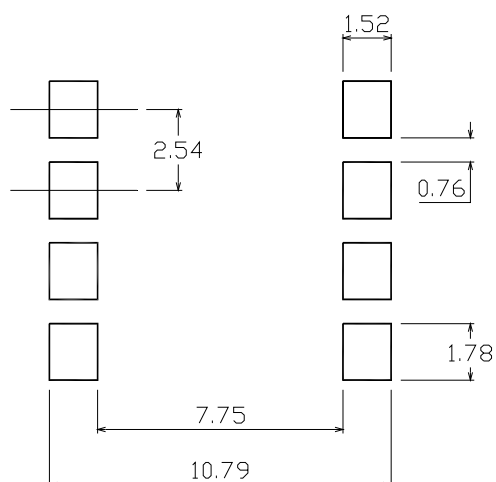
6N135, 6N136, ICPL4502, ICPL4503

PACKAGE DIMENSIONS (mm)

SMD



RECOMMENDED PAD LAYOUT FOR SMD (mm)

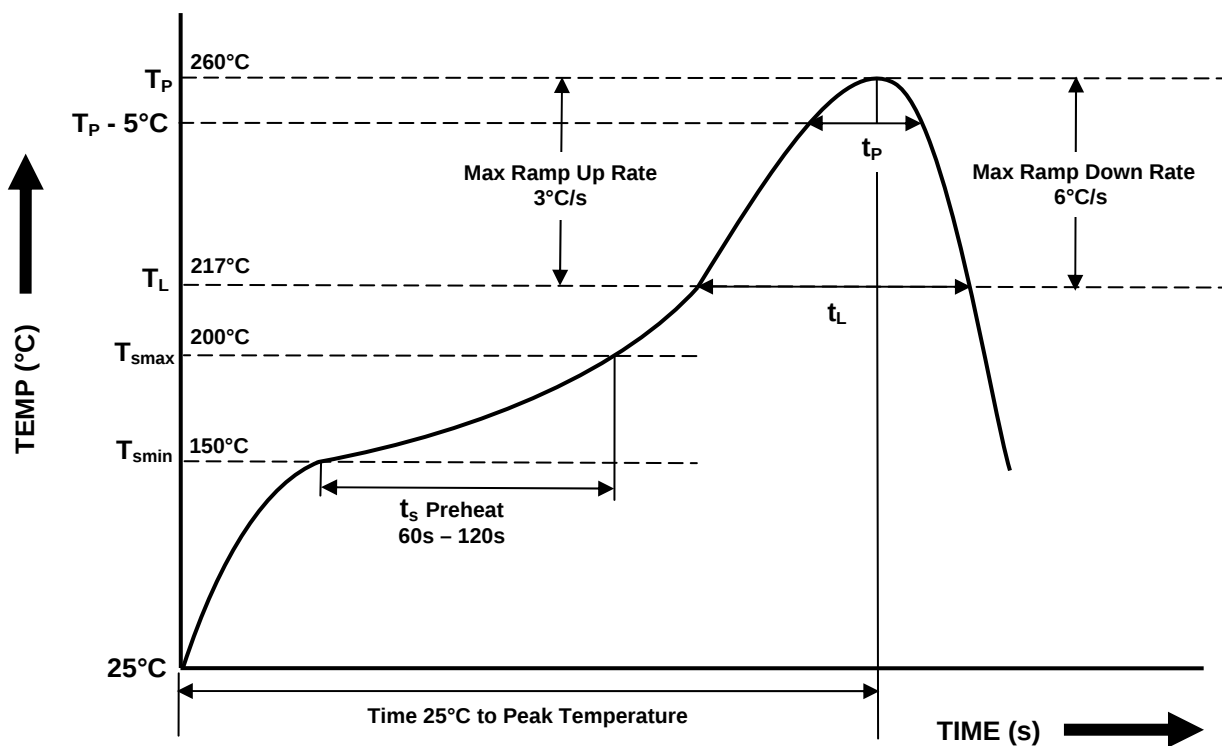




6N135, 6N136, ICPL4502, ICPL4503

REFLOW SOLDERING TEMPERATURE PROFILE

(One Time Reflow Soldering is Recommended)



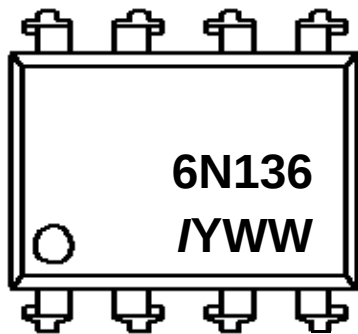
Profile Details	Conditions
Preheat - Min Temperature (T_{smin}) - Max Temperature (T_{smax}) - Time T_{smin} to T_{smax} (t_s)	150°C 200°C 60s - 120s
Soldering Zone - Peak Temperature (T_P) - Liquidous Temperature (T_L) - Time within 5°C of Actual Peak Temperature ($T_P - 5^\circ\text{C}$) - Time maintained above T_L (t_L) - Ramp Up Rate (T_L to T_P) - Ramp Down Rate (T_P to T_L)	260°C 217°C 30s 60s - 100s 3°C/s max 6°C/s max
Average Ramp Up Rate (T_{smax} to T_P)	3°C/s max
Time 25°C to Peak Temperature	8 minutes max



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DEVICE MARKING (Example 6N136)

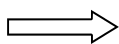
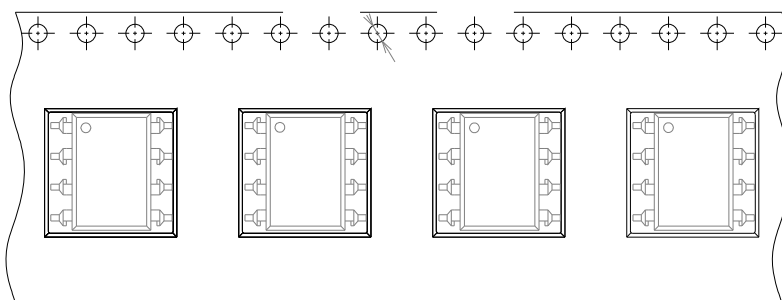


6N136	denotes Device Part Number
Y	denotes 1 digit Year code
WW	denotes 2 digit Week code
/	denotes Isocom

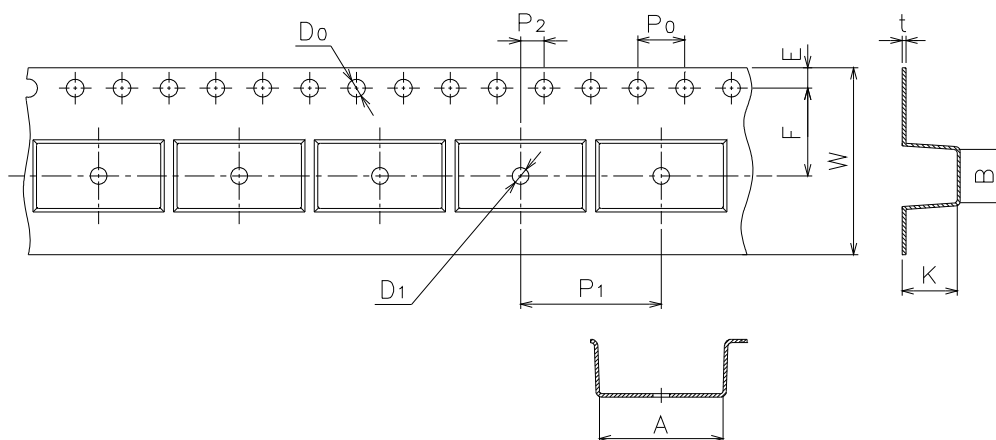


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TAPE AND REEL PACKAGING



Direction of feed from reel



Dimension No.	A	B	Do	D1	E	F
Dimension(mm)	10.4±0.1	10.0±0.1	1.5±0.1	1.5±0.1	1.75±0.1	7.5±0.1
Dimension No.	Po	P1	P2	t	W	K
Dimension (mm)	4.0±0.1	12.0±0.1	2.0±0.1	0.4±0.1	16.0+0.3/ -0.1	4.5±0.1



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NOTES :

- Isocom is continually improving the quality, reliability, function or design and Isocom reserves the right to make changes without further notices.
- The products shown in this publication are designed for the general use in electronic applications such as office automation equipment, communications devices, audio/visual equipment, electrical application and instrumentation.
- For equipment/application where high reliability or safety is required, such as space applications, nuclear power control equipment, medical equipment, etc., please contact our sales representatives.
- When requiring a device for any "specific" application, please contact our sales for advice.
- The contents described herein are subject to change without prior notice.
- Do not immerse device body in solder paste.