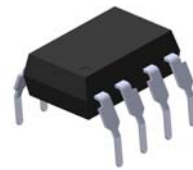
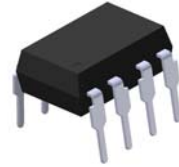


8 PIN DIP HIGH SPEED 1Mbit/s TRANSISTOR PHOTOCOUPLER

**6N135 6N136
ICPL4502**

Features

- High speed 1Mbit/s
- High isolation voltage between input and output (Viso=5000 Vrms)
- Guaranteed performance from 0°C to 70°C
- Wide operating temperature range of -55°C to 100°C
- Pb free and RoHS compliant



Description

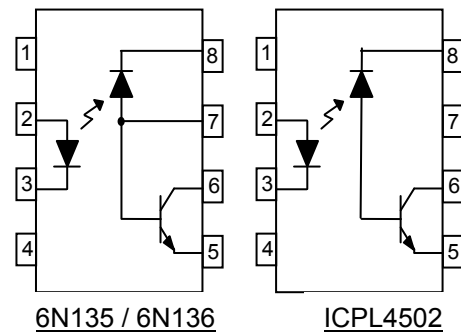
The 6N135, 6N136 and ICPL4502 devices each consist of an infrared emitting diodes, optically coupled to a high speed photo detector. A separate connection for the photodiode bias and output-transistor collector increase the speed by several orders of magnitude over conventional phototransistor couplers by reducing the base-collector capacitance of the input transistor.

They are packaged in an 8-pin DIP package and available in wide-lead spacing and SMD option.

Applications

- Line receivers
- Telecommunication equipments
- Power transistor isolation in motor drives
- Replacement for low phototransistor photo couplers
- Feedback loop in switch-mode power supplies
- Home appliances
- High speed logic ground isolation

Schematic



Pin Configuration

1. No Connection
2. Anode
3. Cathode
4. No Connection
5. Gnd
6. Vout
7. V_B
8. V_{CC}

Pin Configuration

1. No Connection
2. Anode
3. Cathode
4. No Connection
5. Gnd
6. Vout
7. No Connection
8. V_{CC}

**8 PIN DIP HIGH SPEED 1Mbit/s TRANSISTOR
PHOTOCOUPLER**

**6N135 6N136
ICPL4502**

Absolute Maximum Ratings ($T_a=25^\circ\text{C}$)

Parameter		Symbol	Rating	Unit
Input	Forward current	I_F	25	mA
	Peak forward current (50% duty, 1ms P.W)	I_{FP}	50	mA
	Peak transient current ($\leq 1 \mu\text{s}$ P.W, 300pps)	I_{Ftrans}	1	A
	Reverse voltage	V_R	5	V
	Power dissipation	P_{IN}	45	mW
Output	Power dissipation	P_O	100	mW
	Emitter-Base reverse voltage	6N135 6N136 V_{EBR}	5	V
	Base current	6N135 6N136 I_B	5	mA
	Average Output current	$I_{O(AVG)}$	8	mA
	Peak Output current	$I_{O(PK)}$	16	mA
	Output voltage	V_O	-0.5 to 20	V
	Supply voltage	V_{CC}	-0.5 to 30	V
Isolation voltage ^{*1}		V_{ISO}	5000	V rms
Operating temperature		T_{OPR}	-55 ~ +100	$^\circ\text{C}$
Storage temperature		T_{STG}	-55 ~ +125	$^\circ\text{C}$
Soldering temperature ^{*2}		T_{SOL}	260	$^\circ\text{C}$

Notes

*1 AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 2, 3, 4 are shorted together, and pins 5, 6, 7, 8 are shorted together.

*2 For 10 seconds.

**8 PIN DIP HIGH SPEED 1Mbit/s TRANSISTOR
PHOTOCOUPLER**

**6N135 6N136
ICPL4502**

Electrical Characteristics ($T_A=0$ to 70°C unless specified otherwise)

Input

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Conditions
Forward voltage	V_F	-	1.45	1.8	V	$I_F = 16\text{mA}$
Reverse Voltage	V_R	5.0	-	-	V	$I_R = 10\mu\text{A}$
Temperature coefficient of forward voltage	$\Delta V_F/\Delta T_A$	-	-1.9	-	mV/ $^\circ\text{C}$	$I_F = 16\text{mA}$

Output

Parameter	Symbol	Min.	Typ.*	Max.	Unit	Conditions
Logic High Output Current	I_{OH}	-	0.001	0.5	μA	$I_F=0\text{mA}$, $V_O=V_{CC}=5.5\text{V}$, $T_A=25^\circ\text{C}$
		-	0.01	1		$I_F=0\text{mA}$, $V_O=V_{CC}=15\text{V}$, $T_A=25^\circ\text{C}$
		-	-	50		$I_F=0\text{mA}$, $V_O=V_{CC}=15\text{V}$
Logic Low Supply Current	I_{CCL}	-	150	200	μA	$I_F=16\text{mA}$, $V_O=\text{Open}$, $V_{CC}=15\text{V}$
Logic High Supply Current	I_{CCH}	-	0.01	1	μA	$I_F=0\text{mA}$, $V_O=\text{Open}$, $V_{CC}=15\text{V}$, $T_A=25^\circ\text{C}$
		-	-	2		$I_F=0\text{mA}$, $V_O=\text{Open}$, $V_{CC}=15\text{V}$

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

8 PIN DIP HIGH SPEED 1Mbit/s TRANSISTOR PHOTOCOUPLER

6N135 6N136 ICPL4502

Transfer Characteristics ($T_A=0$ to 70°C unless specified otherwise)

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

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

Parameter		Symbol	Min.	Typ.*	Max.	Unit	Conditions
Propagation Delay Time to Logic Low	6N135	TPHL	-	0.15	1.5	μs	$R_L=4.1\text{K}\Omega, T_A=25^\circ\text{C}$
			-	-	2.0		$R_L=4.1\text{K}\Omega$
	6N136 ICPL4502		-	0.15	0.8		$R_L=1.9\text{K}\Omega, T_A=25^\circ\text{C}$
			-	-	1.0		$R_L=1.9\text{K}\Omega$
Propagation Delay Time to Logic High	6N135	TPLH	-	0.7	1.5	μs	$R_L=4.1\text{K}\Omega, T_A=25^\circ\text{C}$
			-	-	2.0		$R_L=4.1\text{K}\Omega$
	6N136 ICPL4502		-	0.4	0.8		$R_L=1.9\text{K}\Omega, T_A=25^\circ\text{C}$
			-	-	1.0		$R_L=1.9\text{K}\Omega$
Common Mode Transient Immunity at Logic High	6N135	CM_H	1,000	-	-	$\text{V}/\mu\text{s}$	$I_F = 0\text{mA}, V_{CM}=10\text{Vp-p}, R_L=4.1\text{K}\Omega, T_A = 25^\circ\text{C}$
	6N136 ICPL4502		1,000	-	-		$I_F = 0\text{mA}, V_{CM}=10\text{Vp-p}, R_L=1.9\text{K}\Omega, T_A = 25^\circ\text{C}$
Common Mode Transient Immunity at Logic Low	6N135	CM_L	1,000	-	-	$\text{V}/\mu\text{s}$	$I_F = 16\text{mA}, V_{CM}=10\text{Vp-p}, R_L=4.1\text{K}\Omega, T_A = 25^\circ\text{C}$
	6N136 ICPL4502		1,000	-	-		$I_F = 16\text{mA}, V_{CM}=10\text{Vp-p}, R_L=1.9\text{K}\Omega, T_A = 25^\circ\text{C}$

Typical Performance Curves

Figure 1. Forward Current vs Forward Voltage

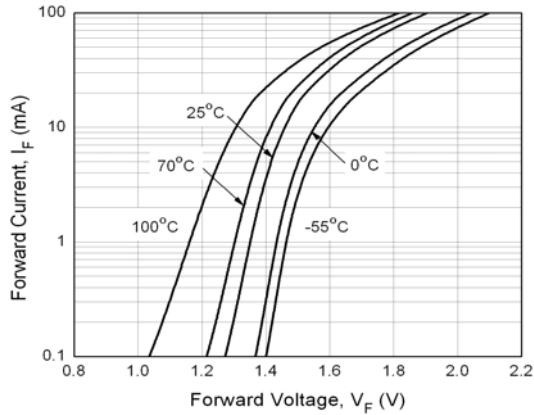


Figure 2. Normalized Current Transfer Ratio vs Forward Current

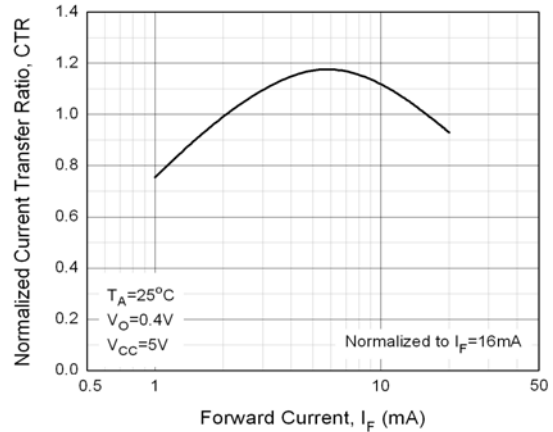


Figure 3. Normalized Current Transfer Ratio vs Ambient Temperature

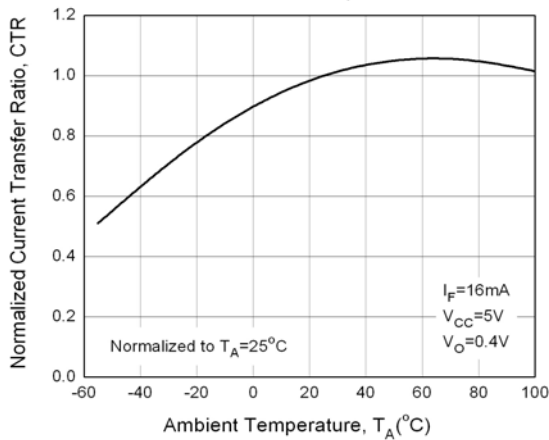


Figure 4. Output Current vs Output Voltage

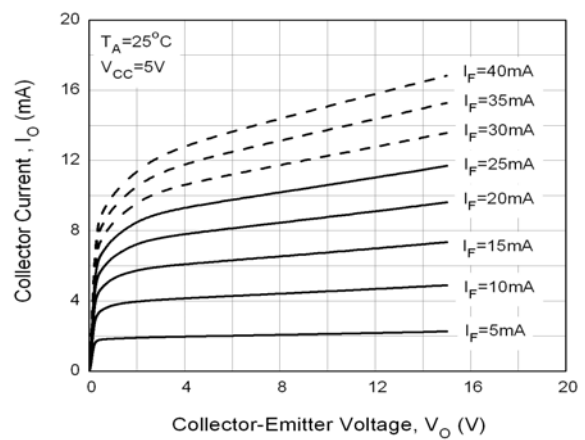


Figure 5. Logic High Output Current vs Ambient Temperature

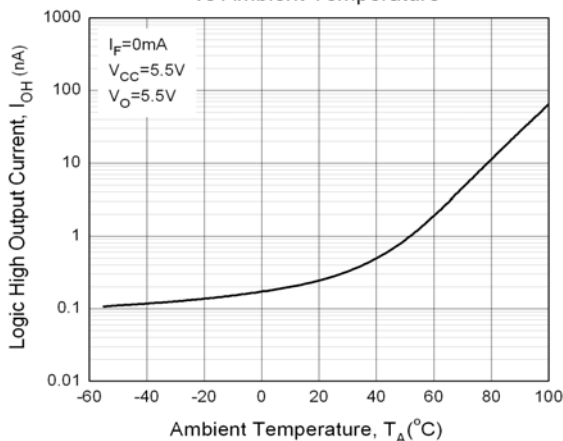
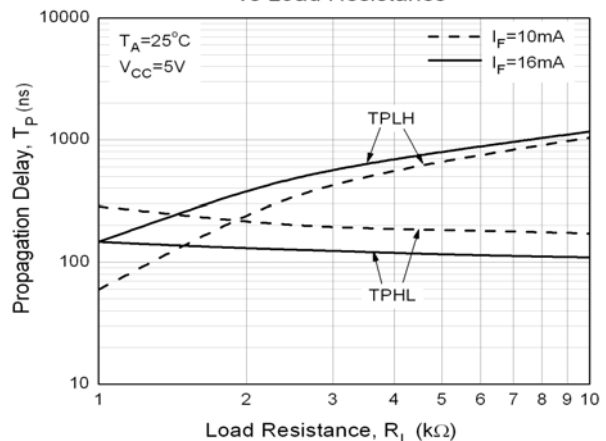


Figure 6. Propagation Delay vs Load Resistance



8 PIN DIP HIGH SPEED 1Mbit/s TRANSISTOR PHOTOCOUPLER

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Figure 7. Propagation Delay vs Ambient Temperature

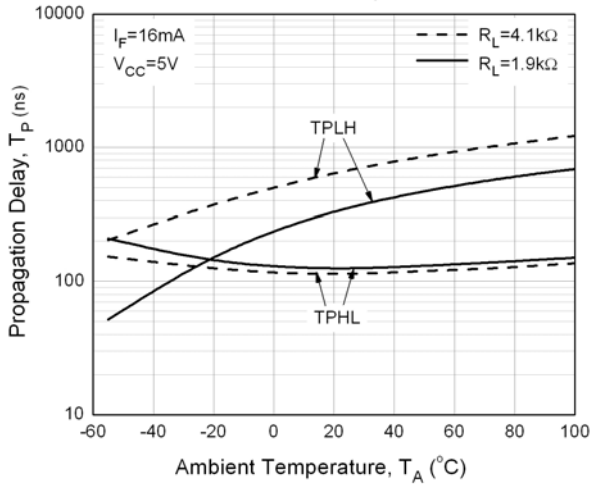


Figure 8 Switching Time Test Circuit & Waveform

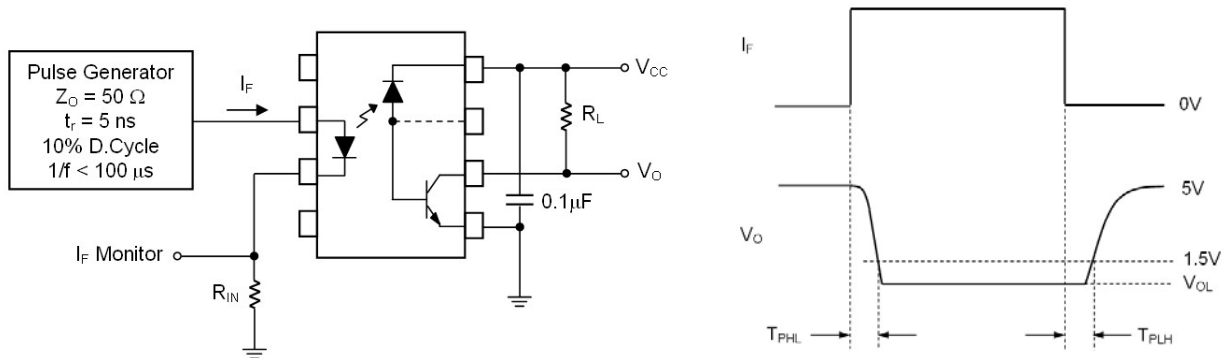
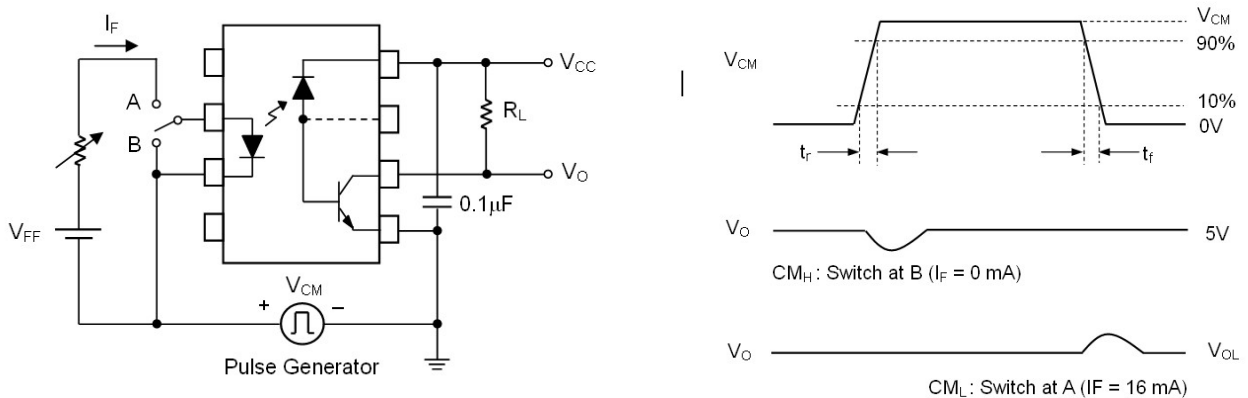
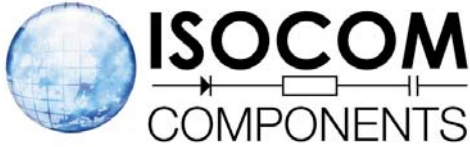


Figure 9 Transient Immunity Test Circuit &



Order Information



**8 PIN DIP HIGH SPEED 1Mbit/s TRANSISTOR
PHOTOCOUPLER**

**6N135 6N136
ICPL4502**

Part Number

6N13XY

or

ICPL4502Y

Note

X = Part No. (X = 5 or 6 for 6N13X)
Y = Lead form option (G SM or none)

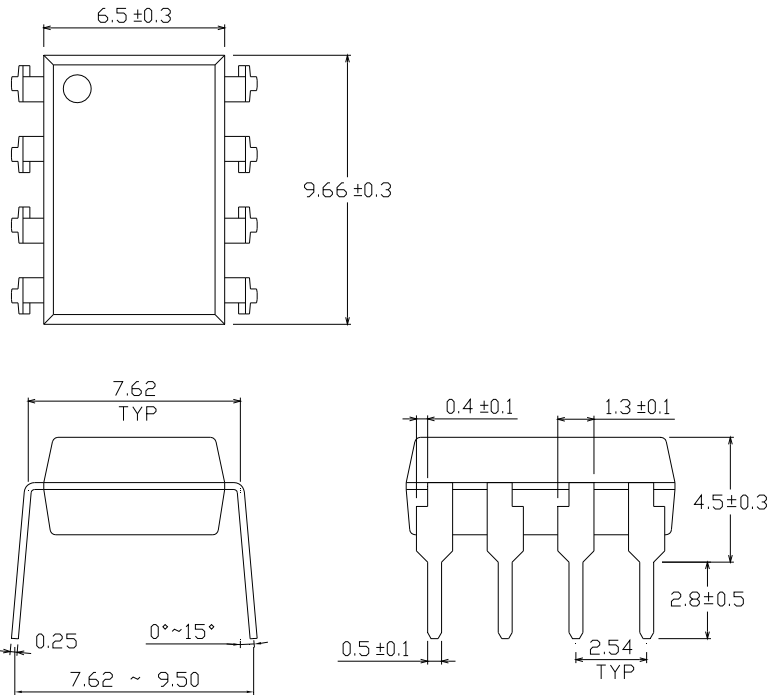
Option	Description	Packing quantity
None	Standard DIP-8	45 units per tube
G	Wide lead bend (0.4 inch spacing)	45 units per tube
SM	Surface mount lead in tubes	45 units per tube
SM T+R	Surface mount lead form (low profile) + TA tape & reel option	1000 units per reel

**8 PIN DIP HIGH SPEED 1Mbit/s TRANSISTOR
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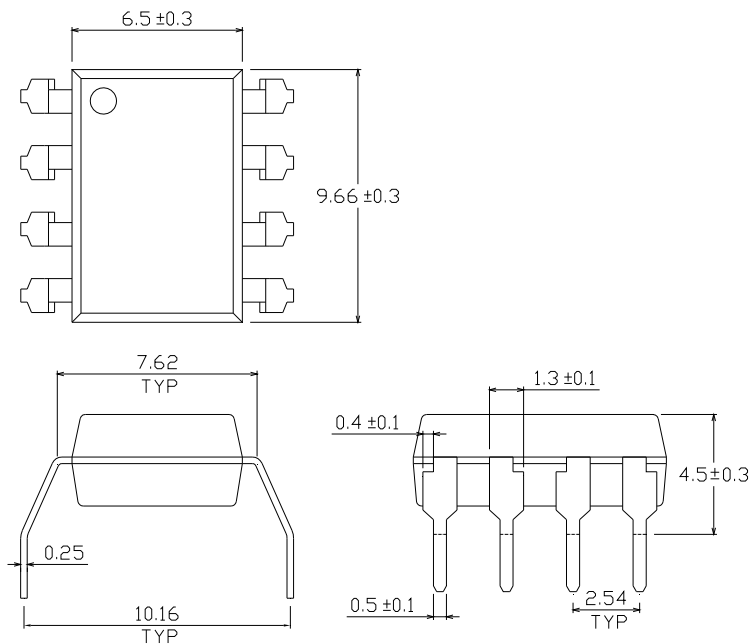
**6N135 6N136
ICPL4502**

**Package Drawing
(Dimensions in mm)**

Standard DIP Type



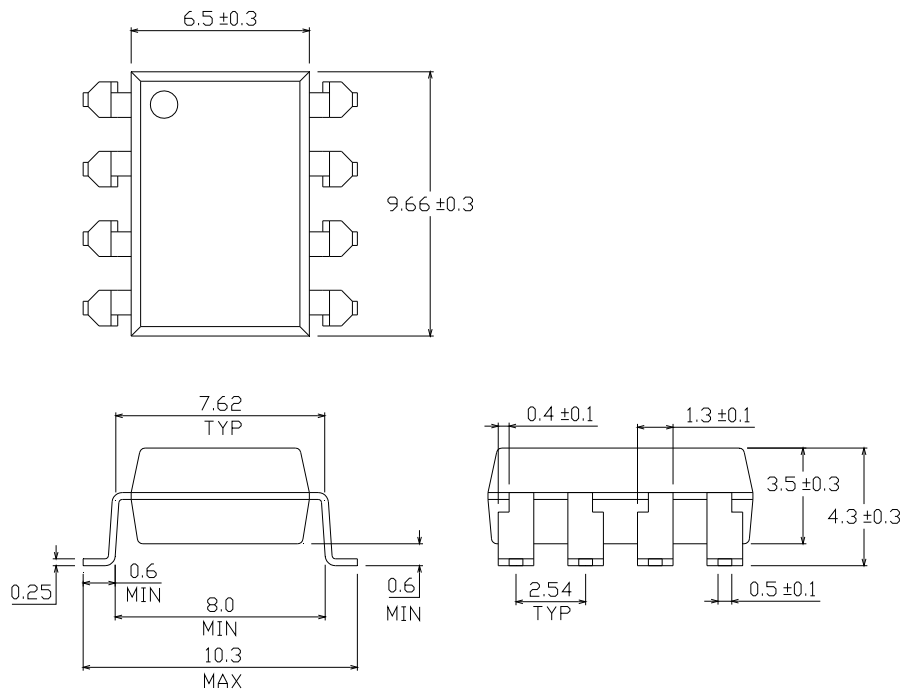
Option G Type



**8 PIN DIP HIGH SPEED 1Mbit/s TRANSISTOR
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**6N135 6N136
ICPL4502**

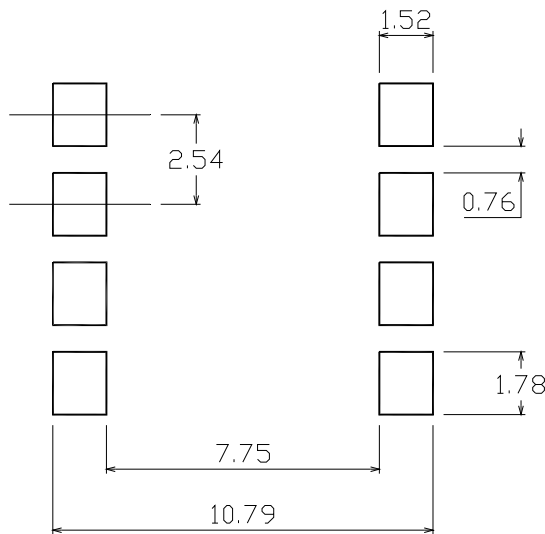
Option SM Type



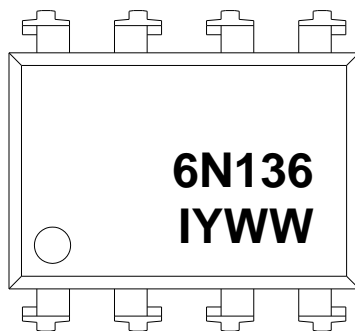
**8 PIN DIP HIGH SPEED 1Mbit/s TRANSISTOR
PHOTOCOUPLER**

**6N135 6N136
ICPL4502**

Recommended pad layout for surface mount leadform



Device Marking



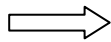
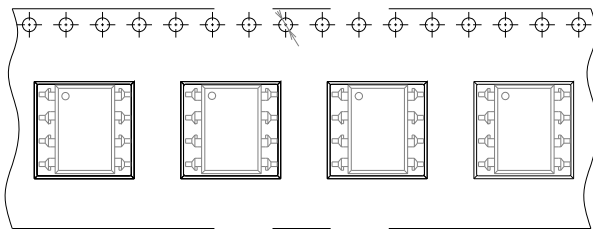
Notes

- 6N136 denotes Device Number
- Y denotes 1 digit Year code
- WW denotes 2 digit Week code
- I denotes Isocom

**8 PIN DIP HIGH SPEED 1Mbit/s TRANSISTOR
PHOTOCOUPLER**

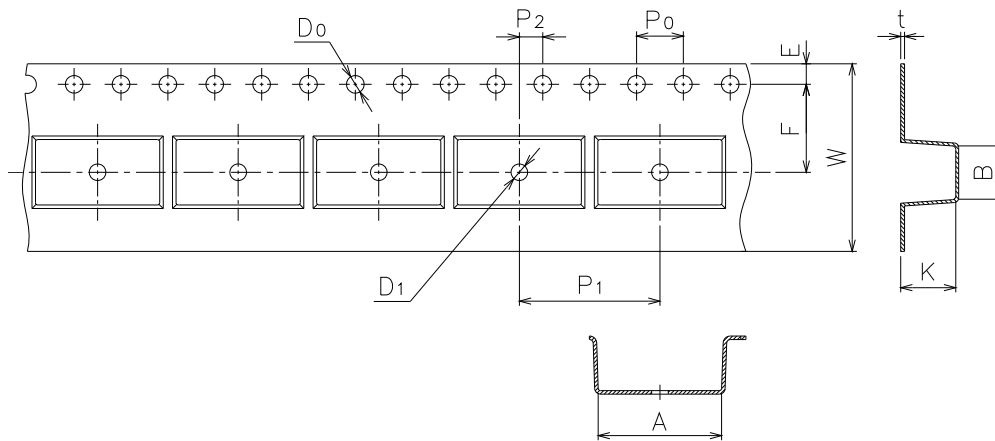
**6N135 6N136
ICPL4502**

Tape & Reel Packing Specifications



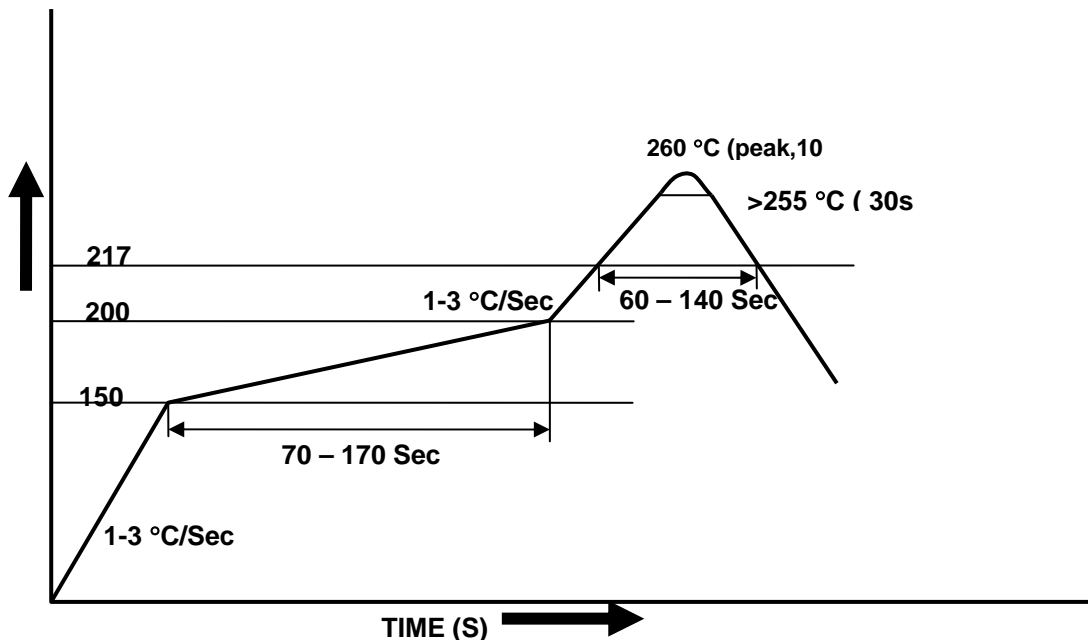
Direction of feed from reel

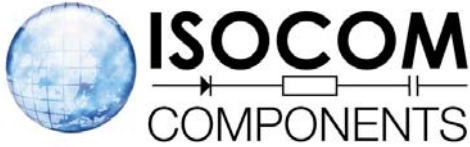
Tape dimensions



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

Solder Reflow Temperature Profile





8 PIN DIP HIGH SPEED 1Mbit/s TRANSISTOR PHOTOCOUPLER

**6N135 6N136
ICPL4502**

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