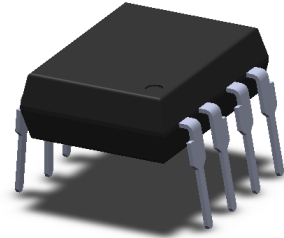
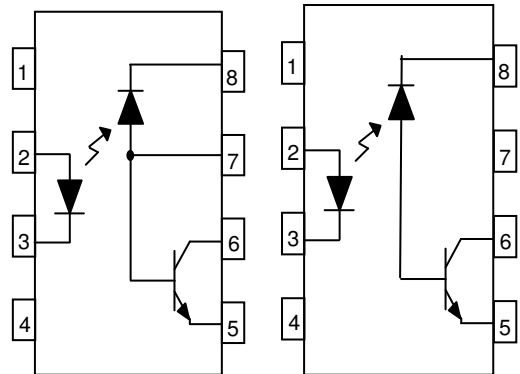


Features

- High speed 1Mbit/s
- High isolation voltage between input and output ($V_{iso}=5000 V_{rms}$)
- Guaranteed performance from 0°C to 70°C
- Wide operating temperature range of -55°C to 100°C
- Pb free and RoHS compliant
- UL approved (No. 214129)
- VDE approved (No. 132249)
- SEMKO approved
- NEMKO approved
- DEMKO approved
- FIMKO approved
- CSA approved (No. 2037145)



Schematic



ELW135 / ELW136

ELW4503

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}

Description

The ELW135, ELW136 and ELW4503 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.

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

Applications

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

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	ELW135 ELW136 V_{EBR}	5	V
	Base current	ELW135 ELW136 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.

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}	-	110	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 $T_A = 25^\circ\text{C}$

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

Parameter		Symbol	Min.	Typ.*	Max.	Unit	Conditions
Current Transfer Ratio	ELW135	CTR	7	-	50	%	$I_F = 16\text{mA}, V_O = 0.4\text{V}, V_{CC}=4.5\text{V}, T_A=25^\circ\text{C}$
	ELW136 ELW4503		19	-	50		
	ELW135		5	-	-		$I_F = 16\text{mA}, V_O = 0.5\text{V}, V_{CC}=4.5\text{V}$
	ELW136 ELW4503		15	-	-		
Logic Low Output Voltage	ELW135	V_{OL}	-	0.18	0.4	V	$I_F = 16\text{mA}, I_O = 1.1\text{mA}, V_{CC}=4.5\text{V}, T_A=25^\circ\text{C}$
	ELW136 ELW4503		-	0.25	0.4		$I_F = 16\text{mA}, I_O = 3\text{mA}, V_{CC}=4.5\text{V}, T_A=25^\circ\text{C}$
	ELW135		-	-	0.5		$I_F = 16\text{mA}, I_O = 0.8\text{mA}, V_{CC}=4.5\text{V}$
	ELW136 ELW4503		-	-	0.5		$I_F=16\text{mA}, I_O=2.4\text{mA}, V_{CC}=4.5\text{V}$

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

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 (Fig.8)	ELW135	TPHL	-	0.36	1.5	μs	$R_L=4.1\text{K}\Omega$, $T_A=25^\circ\text{C}$
			-	-	2.0		$R_L=4.1\text{K}\Omega$
	ELW136 ELW4503		-	0.32	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 (Fig.8)	ELW135	TPLH	-	0.45	1.5	μs	$R_L=4.1\text{K}\Omega$, $T_A=25^\circ\text{C}$
			-	-	2.0		$R_L=4.1\text{K}\Omega$
	ELW136 ELW4503		-	0.25	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 (Fig.9) ^{*3}	ELW135	CM_H	1,000	-	-	$\text{V}/\mu\text{s}$	$I_F=0\text{mA}$, $V_{CM}=10\text{Vp-p}$, $R_L=4.1\text{K}\Omega$, $T_A=25^\circ\text{C}$
	ELW136		1,000	-	-		$I_F=0\text{mA}$, $V_{CM}=10\text{Vp-p}$, $R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$
	ELW4503		15,000	20,000	-		$I_F=0\text{mA}$, $V_{CM}=1500\text{Vp-p}$, $R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$
Common Mode Transient Immunity at Logic Low (Fig.9) ^{*3}	ELW135	CM_L	1,000	-	-	$\text{V}/\mu\text{s}$	$I_F=0\text{mA}$, $V_{CM}=10\text{Vp-p}$, $R_L=4.1\text{K}\Omega$, $T_A=25^\circ\text{C}$
	ELW136		1,000	-	-		$I_F=0\text{mA}$, $V_{CM}=10\text{Vp-p}$, $R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$
	ELW4503		15,000	20,000	-		$I_F=0\text{mA}$, $V_{CM}=1500\text{Vp-p}$, $R_L=1.9\text{K}\Omega$, $T_A=25^\circ\text{C}$

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

Typical Performance Curves

Figure 1. Forward Current vs Forward Voltage

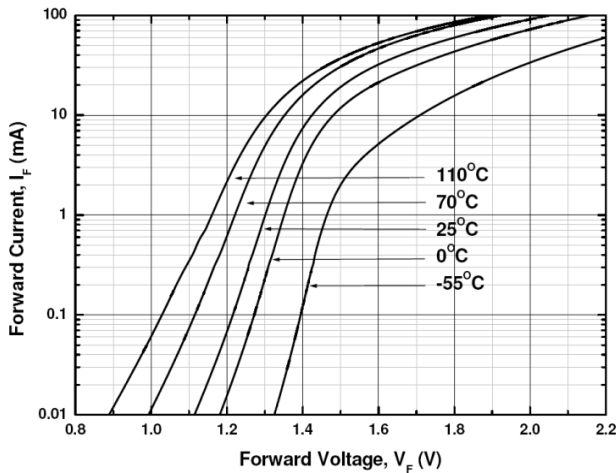


Figure 2. Current Transfer Ratio vs Forward Current

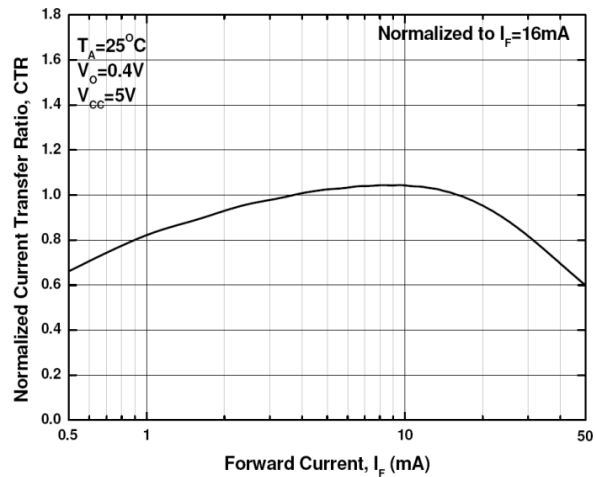


Figure 3. Current Transfer Ratio vs Ambient Temperature

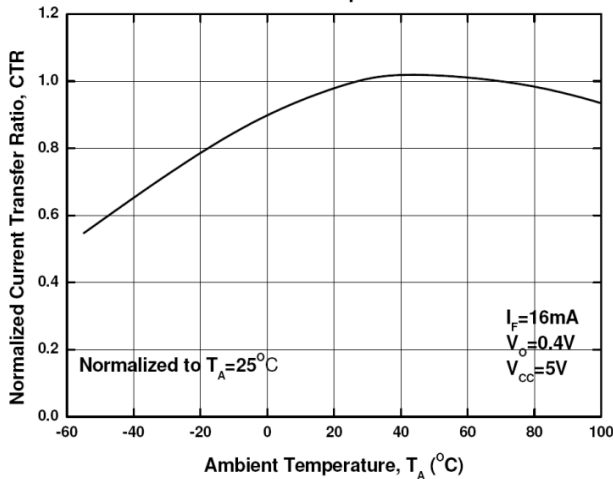


Figure 4. Output Current vs Output Voltage

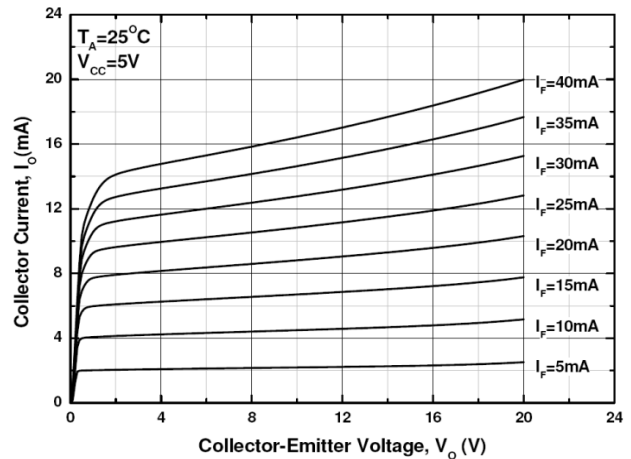


Figure 5. Logic High Output Current vs Ambient Temperature

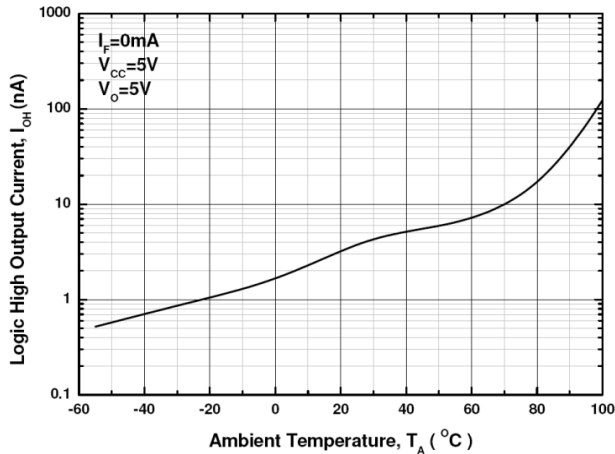


Figure 6. Propagation Delay vs. Load Resistance

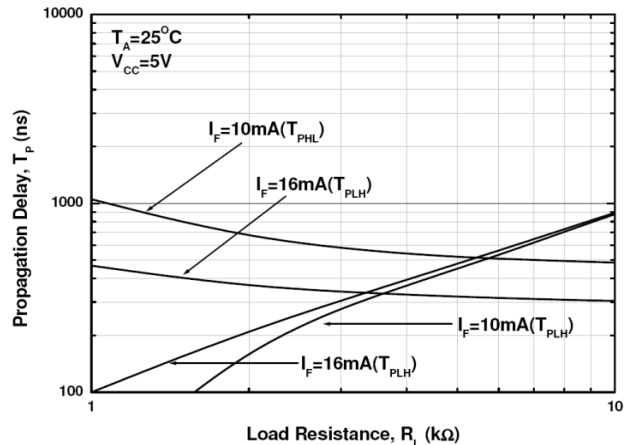


Figure 7. Propagation Delay vs. Temperature

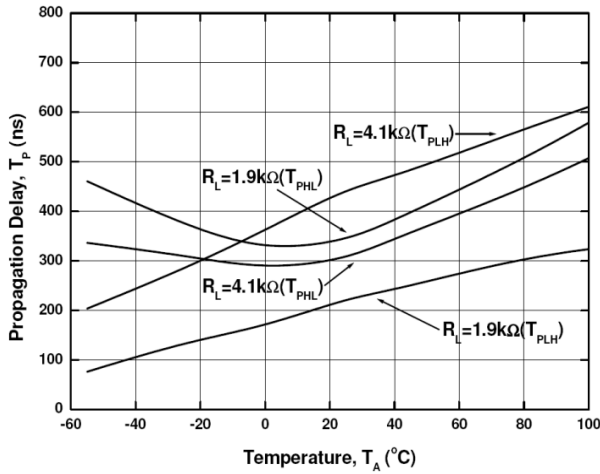


Figure 8 Switching Time Test Circuit & Waveform

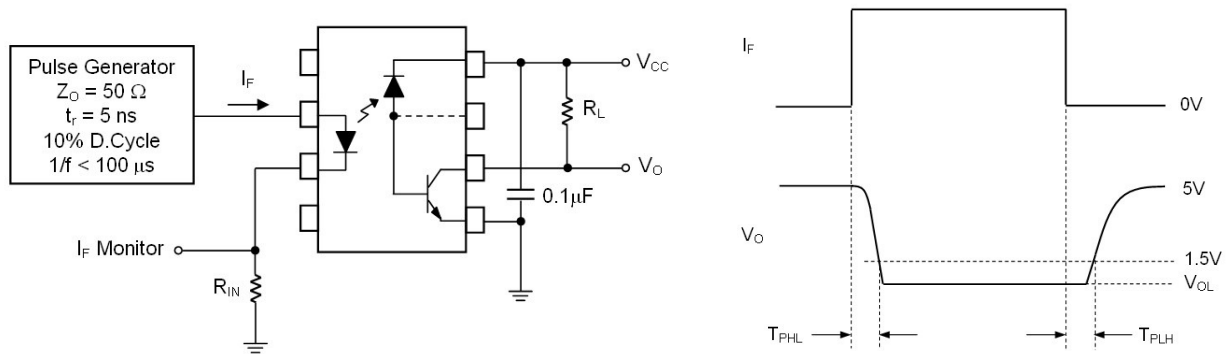
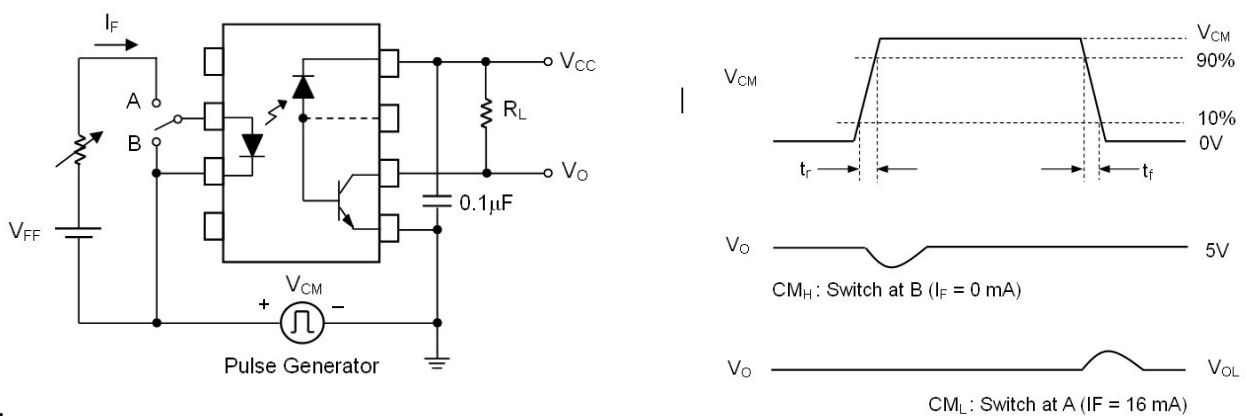


Figure 9 Transient Immunity Test Circuit &



Note:

*3 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

Part Number

ELW13XY(Z)-V

or

ELW4503Y(Z)-V

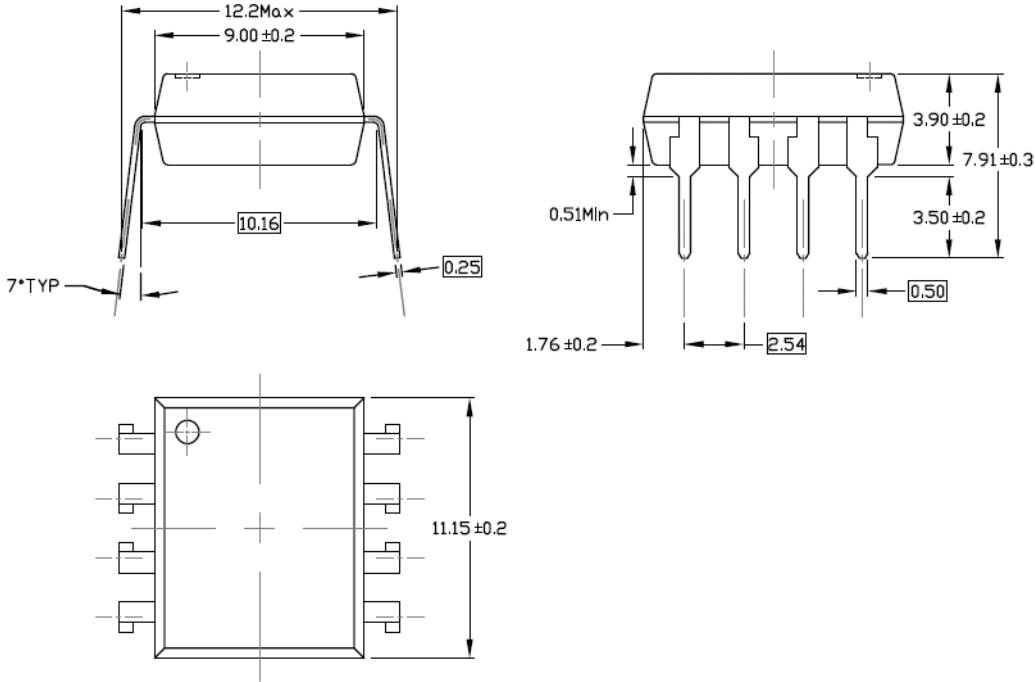
Note

- X = Part No. (X = 5 or 6)
- Y = Lead form option (S or none)
- Z = Tape and reel option (TA, TB or none)
- V = VDE (optional)

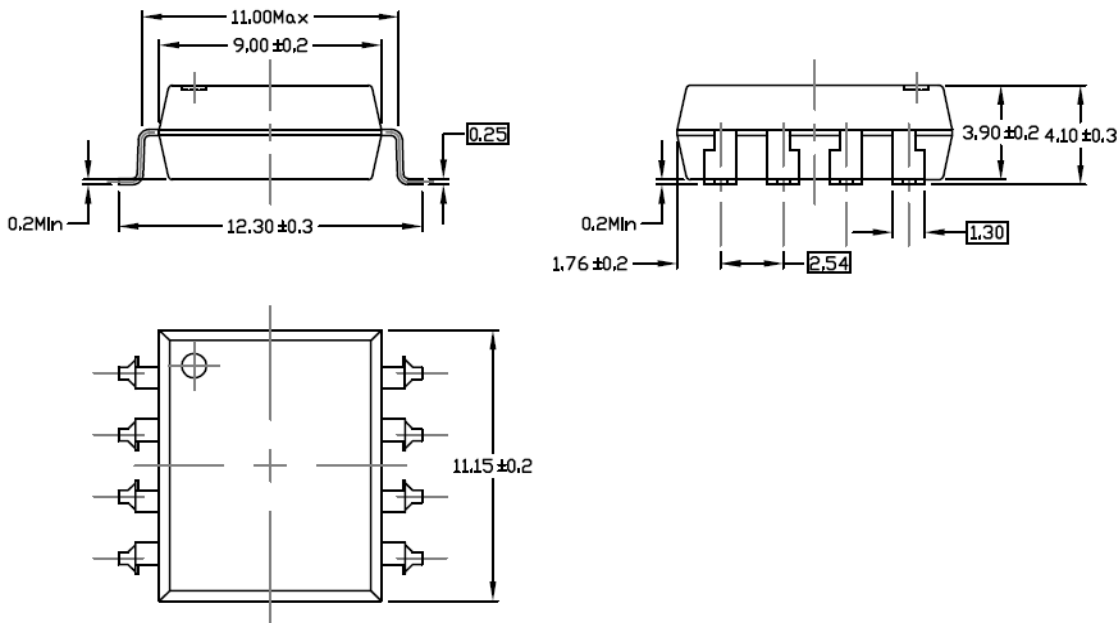
Option	Description	Packing quantity
None	Standard DIP-8	45 units per tube
M	Wide lead bend (0.4 inch spacing)	45 units per tube
S (TA)	Surface mount lead form + TA tape & reel option	1000 units per reel
S (TB)	Surface mount lead form + TB tape & reel option	1000 units per reel

Package Drawing (Dimensions in mm)

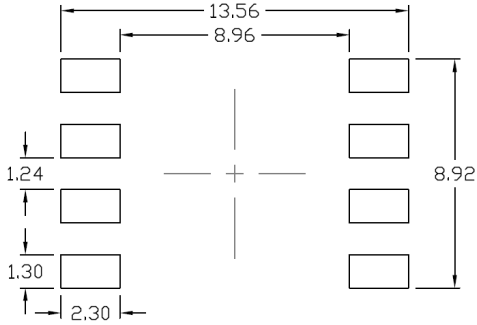
Standard DIP Type



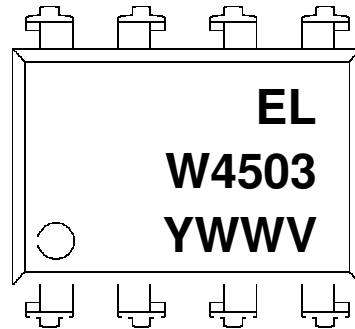
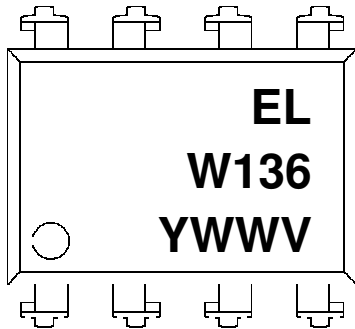
Option S Type



Recommended pad layout for surface mount leadform



Device Marking



Notes

4503

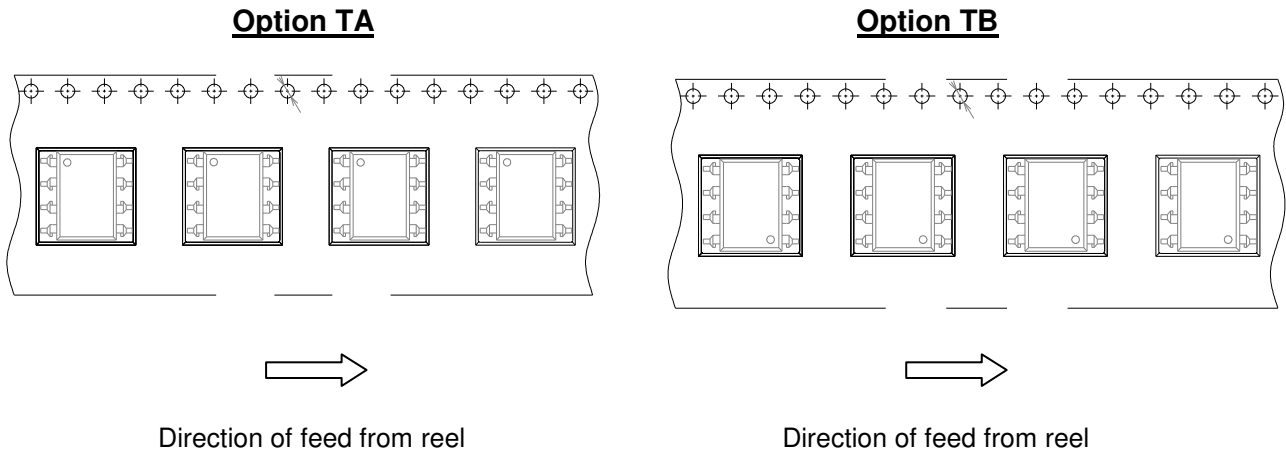
W136 denotes Device Number

Y denotes 1 digit Year code

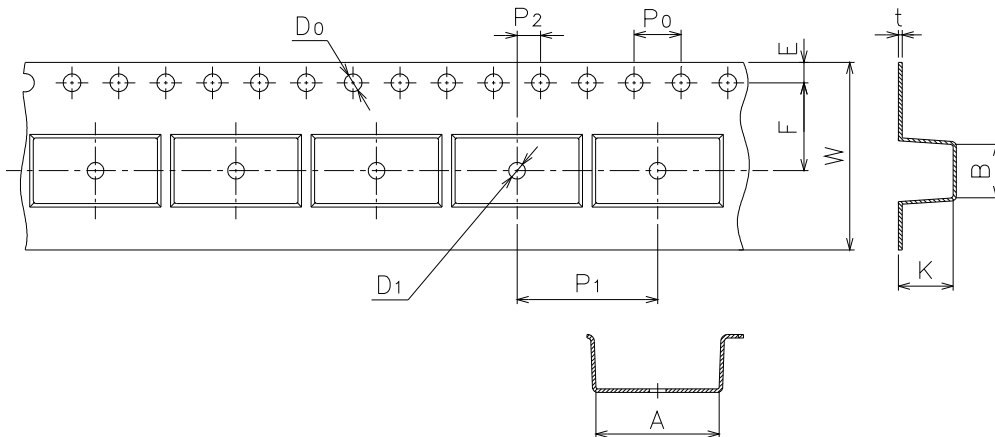
WW denotes 2 digit Week code

V denotes VDE (optional)

Tape & Reel Packing Specifications

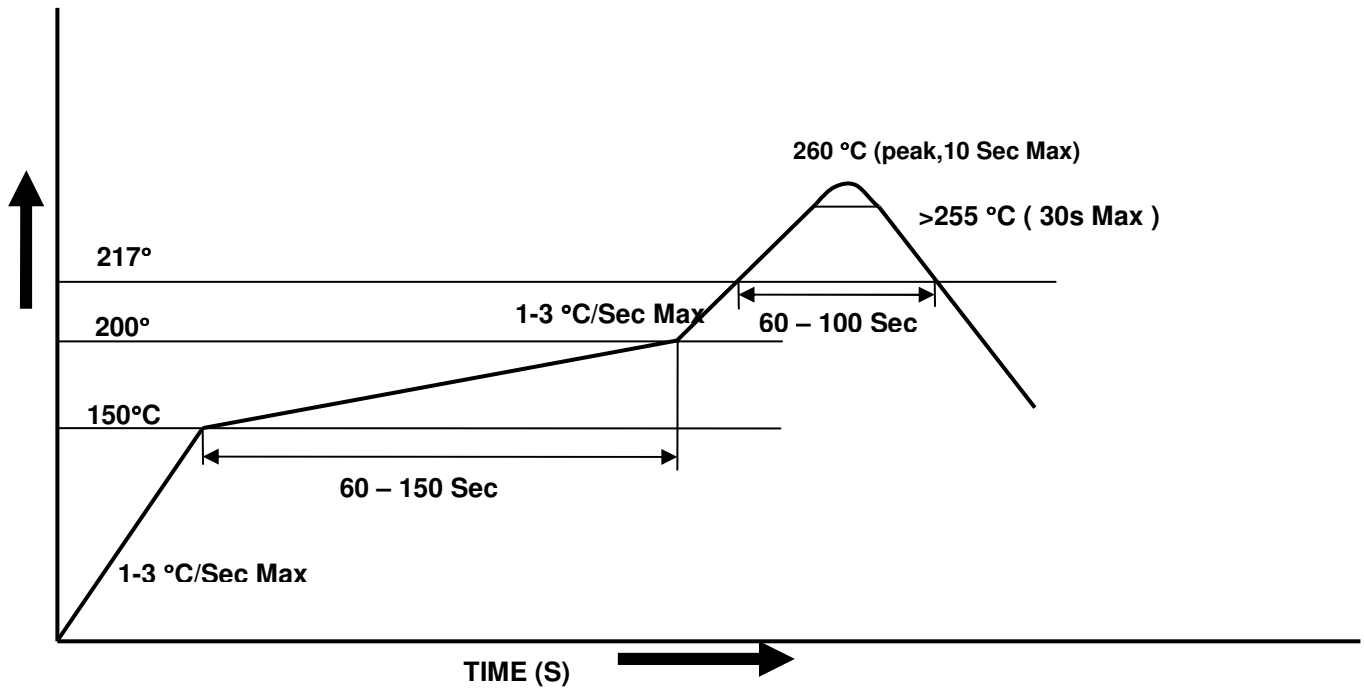


Tape dimensions



Dimension No.	A	B	Do	D1	E	F
Dimension(mm)	14±0.1	13±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



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