



Is Now Part of



ON Semiconductor®

To learn more about ON Semiconductor, please visit our website at
www.onsemi.com

Please note: As part of the Fairchild Semiconductor integration, some of the Fairchild orderable part numbers will need to change in order to meet ON Semiconductor's system requirements. Since the ON Semiconductor product management systems do not have the ability to manage part nomenclature that utilizes an underscore (_), the underscore (_) in the Fairchild part numbers will be changed to a dash (-). This document may contain device numbers with an underscore (_). Please check the ON Semiconductor website to verify the updated device numbers. The most current and up-to-date ordering information can be found at www.onsemi.com. Please email any questions regarding the system integration to Fairchild_questions@onsemi.com.

ON Semiconductor and the ON Semiconductor logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

FOD073L

LVTTL/LVCMOS Compatible Low Input Current High Gain Split Darlington Optocoupler

Features

- Low power consumption
- Low input current: 0.5mA
- Dual channel 8-pin SOIC package
- High CTR: 400% minimum
- High CMR: 10kV/μs
- Guaranteed performance over temperature 0°C to 70°C
- U.L. recognized (File # E90700)
- LVTTL/LVCMOS Compatible output

Applications

- Digital logic ground isolation – LVTTL/LVCMOS
- Telephone ring detector
- EIA-RS-232C line receiver
- High common mode noise line receiver
- μP bus isolation
- Current loop receiver

Description

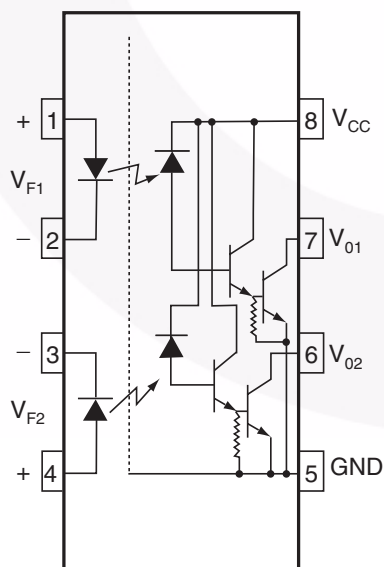
The FOD073L optocoupler consists of an AlGaAs LED optically coupled to a high gain split darlington photo-detector. This device is specified to operate at a 3.3V supply voltage.

An integrated emitter – base resistor provides superior stability over temperature.

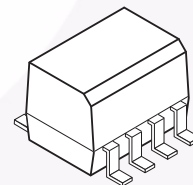
The combination of a very low input current of 0.5mA and a high current transfer ratio of 2000% (typical) makes this device particularly useful for input interface to MOS, CMOS, LSTTL and EIA RS232C, while output compatibility is ensured to LVCMOS as well as high fan-out LVTTL requirements.

An internal noise shield provides exceptional common mode rejection of 10kV/μs.

Schematic



Package Outline



Truth Table

LED	V _O
ON	LOW
OFF	HIGH

Absolute Maximum Ratings (No derating required up to 85°C)

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter		Value	Units
T _{STG}	Storage Temperature		-40 to +125	°C
T _{OPR}	Operating Temperature		-40 to +85	°C
T _{SOL}	Lead Solder Temperature (Wave solder only. See reflow profile for surface mount devices)		260 for 10 sec	°C
EMITTER				
I _F (avg)	DC/Average Forward Input Current	Each Channel	20	mA
I _F (pk)	Peak Forward Input Current (50% duty cycle, 1ms P.W.)	Each Channel	40	mA
I _F (trans)	Peak Transient Input Current (≤1μs P. W., 300 pps)	Each Channel	1.0	A
V _R	Reverse Input Voltage	Each Channel	5	V
P _D	Input Power Dissipation	Each Channel	35	mW
DETECTOR				
I _O (avg)	Average Output Current	Each Channel	60	mA
V _{EB}	Emitter-Base Reverse Voltage (FOD070L, FOD270L)	Each Channel	0.5	V
V _{CC} , V _O	Supply Voltage, Output Voltage	Each Channel	-0.5 to 7	V
P _D	Output power dissipation	Each Channel	100	mW

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

Individual Component Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.*	Max.	Unit
EMITTER						
V _F	Input Forward Voltage	T _A = 25°C I _F = 1.6mA (Each Channel)		1.35	1.7	V
BV _R	Input Reverse Breakdown Voltage	T _A = 25°C, I _R = 10μA (Each Channel)	5.0		1.75	V
DETECTOR						
I _{OH}	Logic High Output Current	I _F = 0 mA, V _O = V _{CC} = 3.3V (Each Channel)		0.05	25	μA
I _{CCL}	Logic Low Supply Current	I _{F1} = I _{F2} = 1.6mA, V _{O1} = V _{O2} = Open, V _{CC} = 3.3V		0.8	3	mA
I _{CCH}	Logic High Supply Current	I _{F1} = I _{F2} = 0mA, V _{O1} = V _{O2} = Open, V _{CC} = 3.3V		0.01	2	μA

Transfer Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.*	Max.	Unit
CTR	COUPLED Current Transfer Ratio (Note 1)	I _F = 0.5mA, V _O = 0.4V, V _{CC} = 3.3V	400		7000	%
V _{OL}	Logic Low Output Voltage	I _F = 1.6mA, I _O = 8mA, V _{CC} = 3.3V		0.07	0.3	V
		I _F = 5mA, I _O = 15mA, V _{CC} = 3.3V		0.07	0.4	

Switching Characteristics (V_{CC} = 3.3 V)

Symbol	Parameter	Test Conditions	Min.	Typ.*	Max.	Unit
T _{PHL}	Propagation Delay Time to Logic LOW	R _L = 4.7kΩ, I _F = 0.5mA (Fig. 9)		5	30	μs
T _{PLH}	Propagation Delay Time to Logic HIGH	R _L = 4.7kΩ, I _F = 0.5mA (Fig. 9)		25	90	μs
ICM _H I	Common Mode Transient Immunity at Logic HIGH	I _F = 0 mA, V _{CM} = 10 V _{P-P} , T _A = 25°C, R _L = 2.2kΩ (Note 2) (Fig. 10)	1,000	10,000		V/μs
ICM _L I	Common Mode Transient Immunity at Logic LOW	I _F = 1.6mA, V _{CM} = 10 V _{P-P} , R _L = 2.2kΩ, T _A = 25°C (Note 2) (Fig. 10)	1,000	10,000		V/μs

*All typicals at T_A = 25°C

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

Symbol	Characteristics	Test Conditions	Min.	Typ.*	Max.	Unit
I_{I-O}	Input-Output Insulation Leakage Current	Relative humidity = 45%, $T_A = 25^\circ\text{C}$, $t = 5$ s, $V_{I-O} = 3000$ VDC (Note 3)			1.0	μA
V_{ISO}	Withstand Insulation Test Voltage	$R_H \leq 50\%$, $T_A = 25^\circ\text{C}$, $I_{I-O} \leq 2\mu\text{A}$, $t = 1$ min. (Note 3)	2500			V_{RMS}
R_{I-O}	Resistance (Input to Output)	$V_{I-O} = 500$ VDC (Note 3)		10^{12}		Ω
C_{I-O}	Capacitance (Input to Output)	$f = 1$ MHz (Notes 3, 4)		0.7		pF
I_{I-I}	Input-Input Insulation Leakage Current	$R_H \leq 45\%$, $V_{I-I} = 500$ VDC (Note 5)	0.005			μA
R_{I-I}	Input-Input Resistance	$V_{I-I} = 500$ VDC (Note 5)		10^{11}		Ω
C_{I-I}	Input-Input Capacitance	$f = 1$ MHz (Note 5)		0.03		pF

*All typicals at $T_A = 25^\circ\text{C}$

Notes:

1. Current Transfer Ratio is defined as a ratio of output collector current, I_O , to the forward LED input current, I_F , times 100%.
2. 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., $V_O < 0.8\text{V}$).
3. Device is considered a two terminal device: Pins 1, 2, 3 and 4 are shorted together and Pins 5, 6, 7 and 8 are shorted together.
4. CI-O is measured by shorting pins 1 and 2 or pins 3 and 4 together and pins 5 through 8 shorted together.
5. Measured between pins 1 and 2 shorted together, and pins 3 and 4 shorted together.

Typical Performance Curves

Fig. 1 Input Forward Current vs Forward Voltage

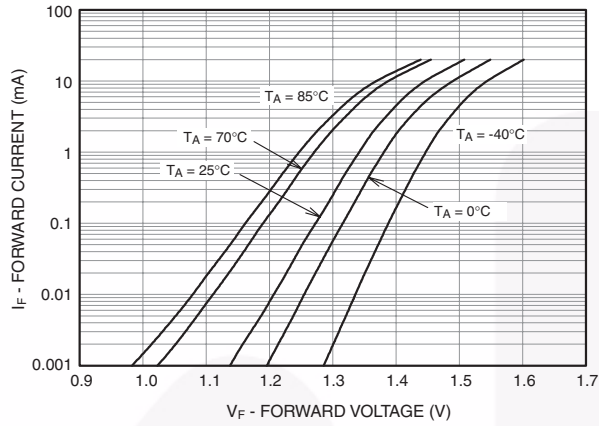


Fig. 2 Current Transfer Ratio vs. Input Forward Current

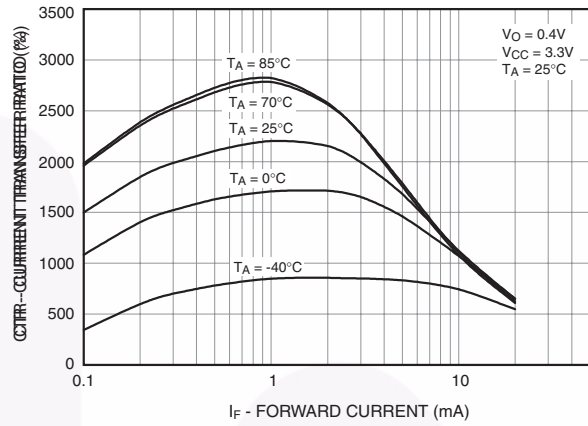


Fig. 3 DC Transfer Characteristics

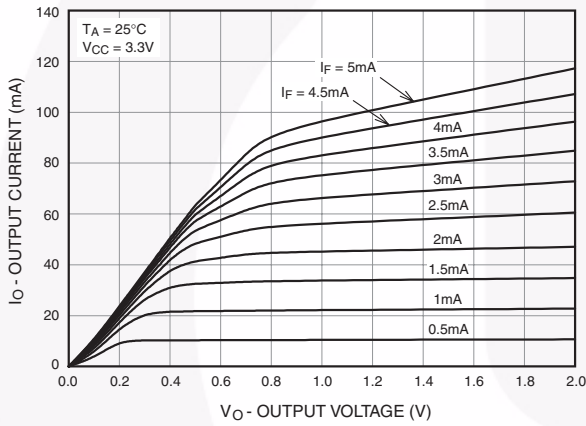


Fig. 4 Supply Current vs Input Forward Current

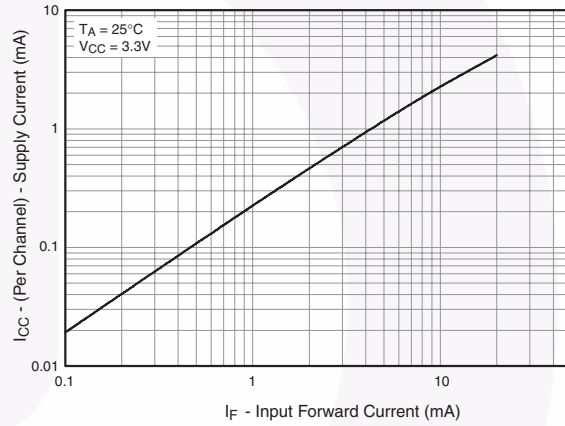


Fig. 5 Output Current vs Input Forward Current

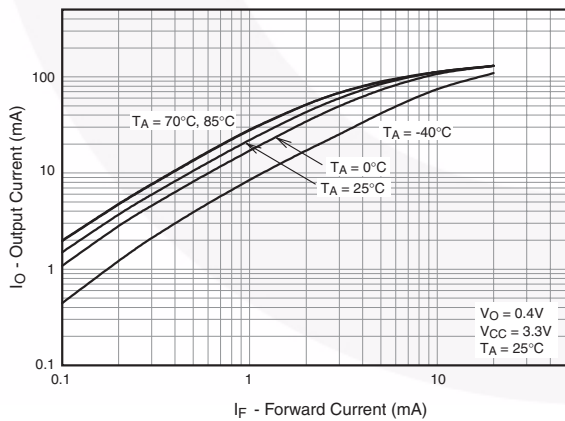
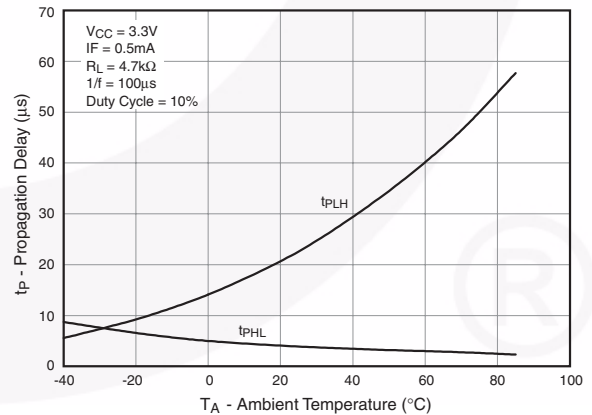


Fig. 6 Propagation Delay vs. Ambient Temperature



Typical Performance Curves (Continued)

Fig. 7 Propagation Delay To Logic Low vs Pulse Period

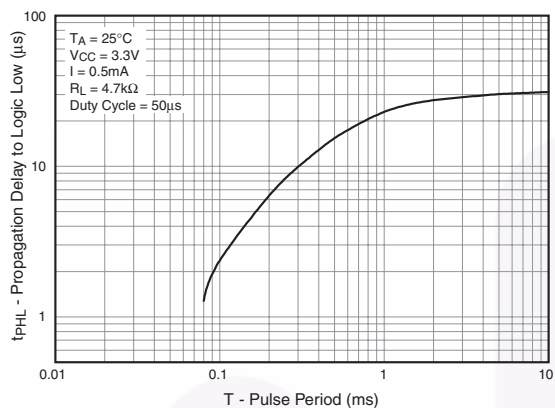
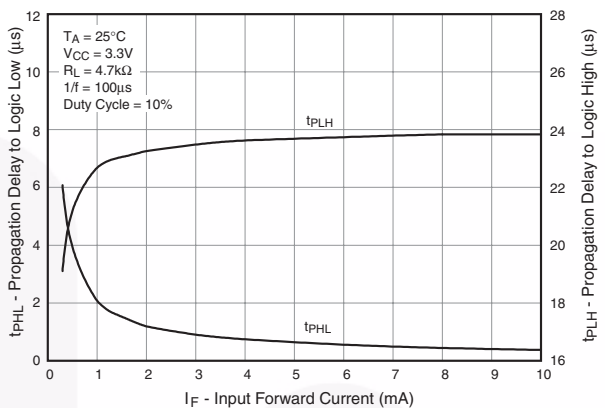


Fig. 8 Propagation Delay vs. Input Forward Current



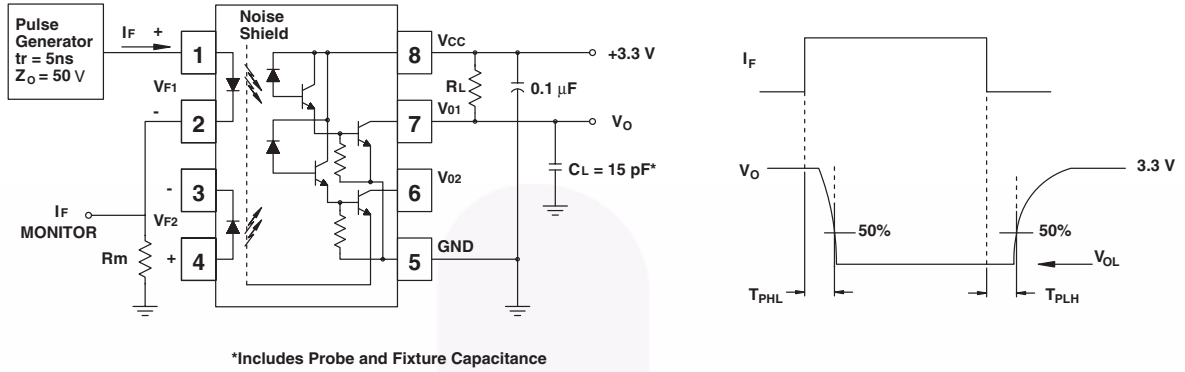


Fig. 9 Switching Time Test Circuit

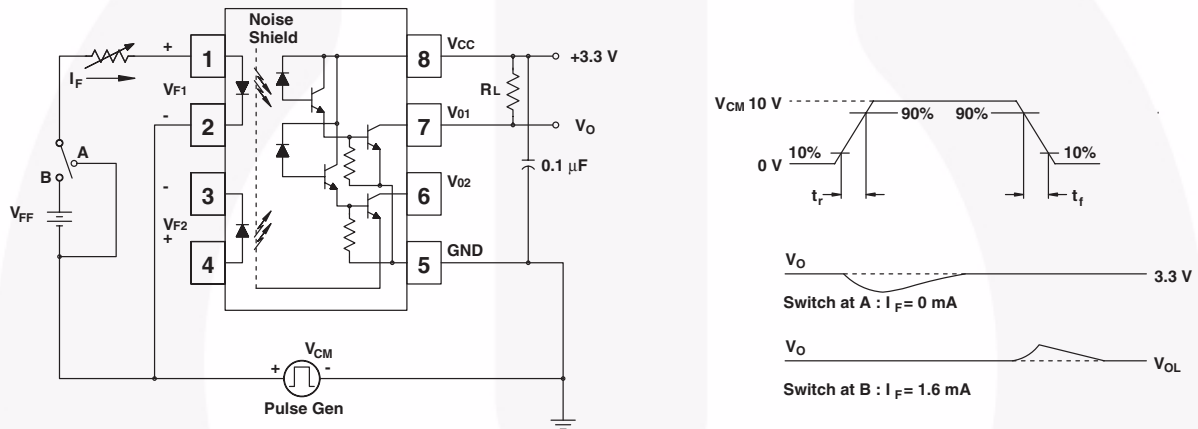
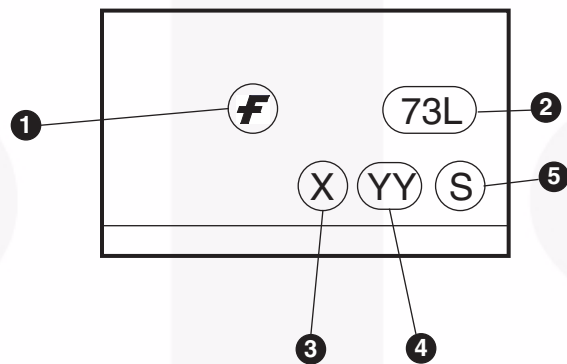


Fig. 10 Common Mode Immunity Test Circuit

Ordering Information

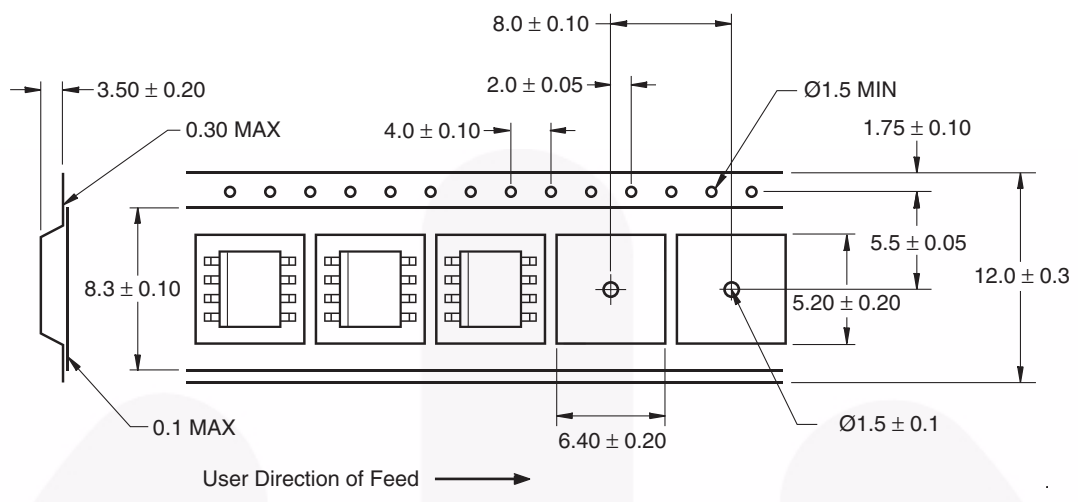
Option	Order Entry Identifier	Description
No Suffix	FOD073L	Shipped in tubes (50 units per tube)
R2	FOD073LR2	Tape and reel (2,500 units per reel)

Marking Information



Definitions	
1	Fairchild logo
2	Device number
3	One digit year code, e.g., '3'
4	Two digit work week ranging from '01' to '53'
5	Assembly package code

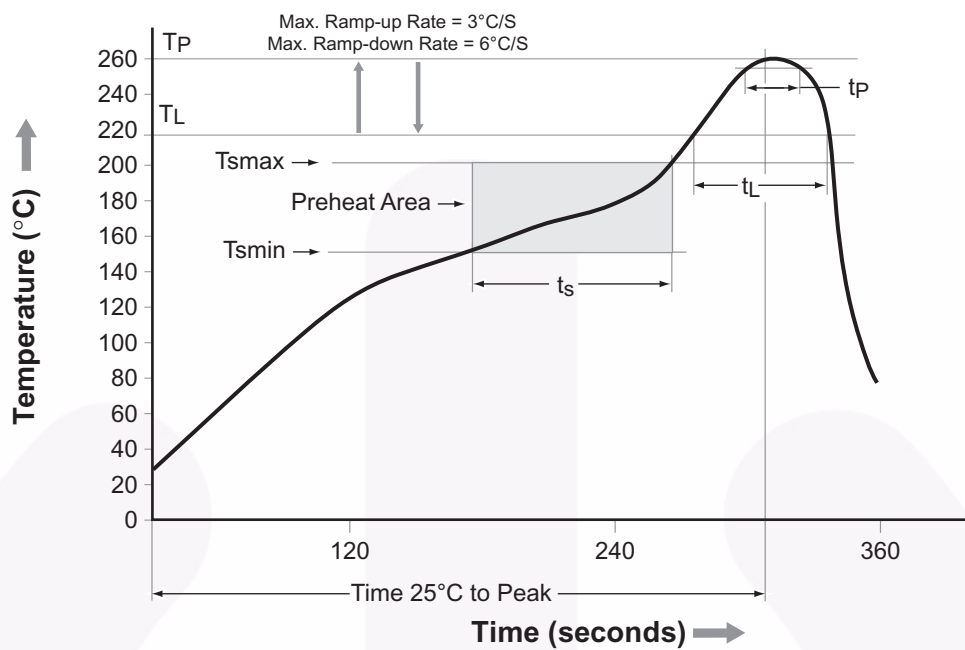
Carrier Tape Specifications



Dimensions in mm



Reflow Profile



Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T _{smín})	150°C
Temperature Max. (T _{smáx})	200°C
Time (t _s) from (T _{smín} to T _{smáx})	60–120 seconds
Ramp-up Rate (t _L to t _p)	3°C/second max.
Liquidous Temperature (T _L)	217°C
Time (t _L) Maintained Above (T _L)	60–150 seconds
Peak Body Package Temperature	260°C +0°C / -5°C
Time (t _p) within 5°C of 260°C	30 seconds
Ramp-down Rate (T _p to T _L)	6°C/second max.
Time 25°C to Peak Temperature	8 minutes max.



NOTES:

- A) NO STANDARD APPLIES TO THIS PACKAGE
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS.
- D) LANDPATTERN STANDARD: SOIC127P600X175-8M.
- E) DRAWING FILENAME: MKT-M08Erev5



ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5817-1050

ON Semiconductor Website: www.onsemi.com
Order Literature: <http://www.onsemi.com/orderlit>
For additional information, please contact your local
Sales Representative