



**THE DATASHEET OF
MC10E457FNR2G**



MC10E457, MC100E457

5 V ECL Triple Differential 2:1 Multiplexer

Description

The MC10E457/100E457 is a 3-bit differential 2:1 multiplexer. The fully differential data path makes the device ideal for multiplexing low skew clock or other skew sensitive signals.

The higher frequency outputs provide the device with a > 1.0 GHz bandwidth to meet the needs of the most demanding system clock.

Both, separate selects and a common select, are provided to make the device well suited for both data path and random logic applications.

The differential inputs have internal clamp structures which will force the Q output of a gate in an open input condition to go to a LOW state. Thus, inputs of unused gates can be left open and will not affect the operation of the rest of the device. Note that the input clamp will take affect only if both inputs fall 2.5 V below V_{CC} .

The 100 Series contains temperature compensation.

Multiple V_{BB} pins are provided to ease AC coupling input signals. The V_{BB} pins, internally generated voltage supply pins, are available to this device only. For single-ended input conditions, the unused differential input is connected to V_{BB} as a switching reference voltage. V_{BB} may also rebias AC coupled inputs. When used, decouple V_{BB} and V_{CC} via a 0.01 μ F capacitor and limit current sourcing or sinking to 0.5 mA. When not used, V_{BB} should be left open.

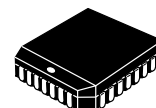
Features

- Differential D and Q; V_{BB} available
- 700 ps Max. Propagation Delay
- High Frequency Outputs
- Separate and Common Select
- PECL Mode Operating Range: $V_{CC} = 4.2$ V to 5.7 V with $V_{EE} = 0$ V
- NECL Mode Operating Range: $V_{CC} = 0$ V with $V_{EE} = -4.2$ V to -5.7 V
- Internal Input 50 k Ω Pulldown Resistors
- ESD Protection:
 - ◆ > 2 kV Human Body Model
 - ◆ > 200 V Machine Model
- Meets or Exceeds JEDEC Spec EIA/JESD78 IC Latchup Test
- Moisture Sensitivity: Level 3 (Pb-Free)
(For Additional Information, see Application Note [AND8003/D](#))
- Flammability Rating: UL 94 V-0 @ 0.125 in, Oxygen Index: 28 to 34
- Transistor Count = 218 Devices
- These Devices are Pb-Free, Halogen Free and are RoHS Compliant



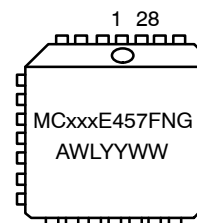
ON Semiconductor®

www.onsemi.com



PLCC-28
FN SUFFIX
CASE 776-02

MARKING DIAGRAM*



xxx = 10 or 100
A = Assembly Location
WL = Wafer Lot
YY = Year
WW = Work Week
G = Pb-Free Package

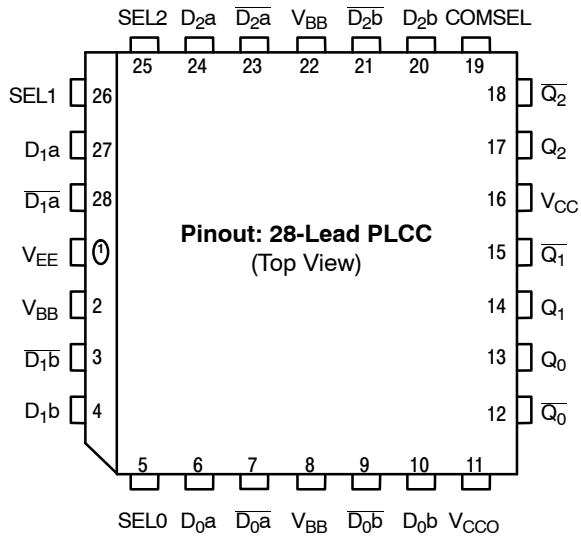
*For additional marking information, refer to Application Note [AND8002/D](#).

ORDERING INFORMATION

Device	Package	Shipping†
MC10E457FNR2G	PLCC-28 (Pb-Free)	500 Tape & Reel
MC100E457FNR	PLCC-28 (Pb-Free)	37 Units / Tube

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, [BRD8011/D](#).

MC10E457, MC100E457



* All V_{CC} and V_{CCO} pins are tied together on the die.

Warning: All V_{CC} , V_{CCO} , and V_{EE} pins must be externally connected to Power Supply to guarantee proper operation.

Figure 1. Pinout Assignment

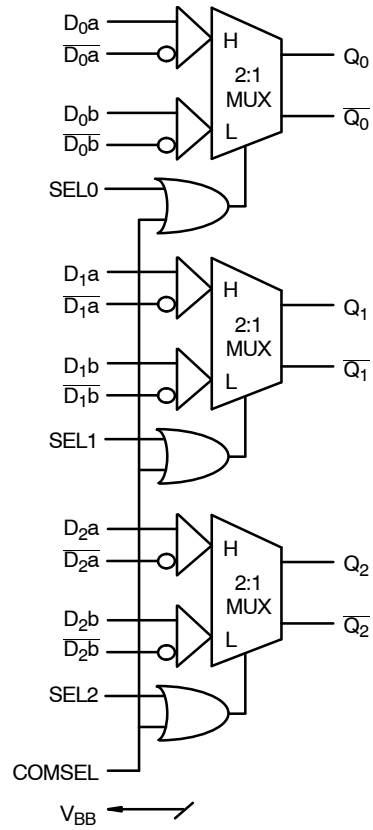


Figure 2. Logic Diagram

Table 1. PIN DESCRIPTION

PIN	FUNCTION
$D_n[0:2]; \overline{D}_n[0:2]$	ECL Differential Data Inputs
SEL	ECL Individual Select Input
COMSEL	ECL Common Select Input
$Q[0:2], \overline{Q}[0:2]$	ECL Differential Data Outputs
V_{BB}	Reference Voltage Output
V_{CC}, V_{CCO}	Positive Supply
V_{EE}	Negative Supply

Table 2. FUNCTION TABLE

SEL	Data
H	a
L	b

MC10E457, MC100E457

Table 3. MAXIMUM RATINGS

Symbol	Parameter	Condition 1	Condition 2	Rating	Unit
V_{CC}	PECL Mode Power Supply	$V_{EE} = 0\text{ V}$		8	V
V_{EE}	NECL Mode Power Supply	$V_{CC} = 0\text{ V}$		-8	V
V_I	PECL Mode Input Voltage NECL Mode Input Voltage	$V_{EE} = 0\text{ V}$ $V_{CC} = 0\text{ V}$	$V_I \leq V_{CC}$ $V_I \geq V_{EE}$	6 -6	V
I_{out}	Output Current	Continuous Surge		50 100	mA
I_{BB}	V_{BB} Sink/Source			± 0.5	mA
T_A	Operating Temperature Range			0 to +85	$^{\circ}\text{C}$
T_{stg}	Storage Temperature Range			-65 to +150	$^{\circ}\text{C}$
θ_{JA}	Thermal Resistance (Junction-to-Ambient)	0 lfpm 500 lfpm	PLCC-28 PLCC-28	63.5 43.5	$^{\circ}\text{C}/\text{W}$
θ_{JC}	Thermal Resistance (Junction-to-Case)	Standard Board	PLCC-28	22 to 26	$^{\circ}\text{C}/\text{W}$
T_{sol}	Wave Solder (Pb-Free)			265	$^{\circ}\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

MC10E457, MC100E457

Table 4. 10E SERIES PECL DC CHARACTERISTICS ($V_{CCx} = 5.0\text{ V}$, $V_{EE} = 0.0\text{ V}$ (Note 1))

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I_{EE}	Power Supply Current		92	110		92	110		92	110		92	110	mA
V_{OH}	Output HIGH Voltage (Note 2)				3980	4070	4160	4020	4105	4190	4090	4185	4280	mV
V_{OL}	Output LOW Voltage (Note 2)				3050	3210	3370	3050	3210	3370	3050	3227	3405	mV
V_{IH}	Input HIGH Voltage (Single-Ended)				3830	3995	4160	3870	4030	4190	3940	4110	4280	mV
V_{IL}	Input LOW Voltage (Single-Ended)				3050	3285	3520	3050	3285	3520	3050	3302	3555	mV
V_{BB}	Output Voltage Reference	3.57		3.7	3.62		3.73	3.65		3.75	3.69		3.81	V
V_{IHCMR}	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3)				2.7		5.0	2.7		5.0	2.7		5.0	V
I_{IH}	Input HIGH Current			150			150			150			150	μA
I_{IL}	Input LOW Current				0.5	0.3		0.5	0.25		0.3	0.2		μA

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

1. Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary $-0.46\text{ V} / +0.06\text{ V}$.
2. Outputs are terminated through a $50\ \Omega$ resistor to $V_{CC} - 2.0\text{ V}$.
3. V_{IHCMR} min varies 1:1 with V_{EE} , max varies 1:1 with V_{CC} .

Table 5. 10E SERIES NECL DC CHARACTERISTICS ($V_{CCx} = 0.0\text{ V}$; $V_{EE} = -5.0\text{ V}$ (Note 1))

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I_{EE}	Power Supply Current		92	110		92	110		92	110		92	110	mA
V_{OH}	Output HIGH Voltage (Note 2)				-1020	-930	-840	-980	-895	-810	-910	-815	-720	mV
V_{OL}	Output LOW Voltage (Note 2)				-1950	-1790	-1630	-1950	-1790	-1630	-1950	-1773	-1595	mV
V_{IH}	Input HIGH Voltage (Single-Ended)				-1170	-1005	-840	-1130	-970	-810	-1060	-890	-720	mV
V_{IL}	Input LOW Voltage (Single-Ended)				-1950	-1715	-1480	-1950	-1715	-1480	-1950	-1698	-1445	mV
V_{BB}	Output Voltage Reference	-1.43		-1.3	-1.38		-1.27	-1.35		-1.25	-1.31		-1.19	V
V_{IHCMR}	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3)				-2.3		0.0	-2.3		0.0	-2.3		0.0	V
I_{IH}	Input HIGH Current			150			150			150			150	μA
I_{IL}	Input LOW Current				0.5	0.3		0.5	0.065		0.3	0.2		μA

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

1. Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary $-0.46\text{ V} / +0.06\text{ V}$.
2. Outputs are terminated through a $50\ \Omega$ resistor to $V_{CC} - 2.0\text{ V}$.
3. V_{IHCMR} min varies 1:1 with V_{EE} , max varies 1:1 with V_{CC} .

MC10E457, MC100E457

Table 6. 100E SERIES PECL DC CHARACTERISTICS ($V_{CCx} = 5.0\text{ V}$, $V_{EE} = 0.0\text{ V}$ (Note 1))

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I_{EE}	Power Supply Current		92	110		92	110		92	110		106	127	mA
V_{OH}	Output HIGH Voltage (Note 2)				3975	4050	4120	3975	4050	4120	3975	4050	4120	mV
V_{OL}	Output LOW Voltage (Note 2)				3190	3295	3380	3190	3255	3380	3190	3260	3380	mV
V_{IH}	Input HIGH Voltage (Single-Ended)				3835	3975	4120	3835	3975	4120	3835	3975	4120	mV
V_{IL}	Input LOW Voltage (Single-Ended)				3190	3355	3525	3190	3355	3525	3190	3355	3525	mV
V_{BB}	Output Voltage Reference	3.62		3.74	3.62		3.74	3.62		3.74	3.62		3.74	V
V_{IHCMR}	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3)				2.7		5.0	2.7		5.0	2.7		5.0	V
I_{IH}	Input HIGH Current			150			150			150			150	μA
I_{IL}	Input LOW Current				0.5	0.3		0.5	0.25		0.5	0.2		μA

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

1. Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary $-0.46\text{ V} / +0.8\text{ V}$.
2. Outputs are terminated through a $50\ \Omega$ resistor to $V_{CC} - 2.0\text{ V}$.
3. V_{IHCMR} min varies 1:1 with V_{EE} , max varies 1:1 with V_{CC} .

Table 7. 100E SERIES NECL DC CHARACTERISTICS ($V_{CCx} = 0.0\text{ V}$; $V_{EE} = -5.0\text{ V}$ (Note 1))

Symbol	Characteristic	-40°C			0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I_{EE}	Power Supply Current		92	110		92	110		92	110		92	110	mA
I_{EE}	Power Supply Current		92	110		92	110		92	110		106	127	mA
V_{OH}	Output HIGH Voltage (Note 2)				-1025	-950	-880	-1025	-950	-880	-1025	-950	-880	mV
V_{OL}	Output LOW Voltage (Note 2)				-1810	-1705	-1620	-1810	-1745	-1620	-1810	-1740	-1620	mV
V_{IH}	Input HIGH Voltage (Single-Ended)				-1165	-1025	-880	-1165	-1025	-880	-1165	-1025	-880	mV
V_{IL}	Input LOW Voltage (Single-Ended)				-1810	-1645	-1475	-1810	-1645	-1475	-1810	-1645	-1475	mV
V_{BB}	Output Voltage Reference	-1.38		-1.26	-1.38		-1.26	-1.38		-1.26	-1.38		-1.26	V
V_{IHCMR}	Input HIGH Voltage Common Mode Range (Differential Configuration) (Note 3)				-2.3		0.0	-2.3		0.0	-2.3		0.0	V
I_{IH}	Input HIGH Current			150			150			150			150	μA
I_{IL}	Input LOW Current				0.5	0.3		0.5	0.25		0.5	0.2		μA

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

1. Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary $-0.46\text{ V} / +0.8\text{ V}$.
2. Outputs are terminated through a $50\ \Omega$ resistor to $V_{CC} - 2.0\text{ V}$.
3. V_{IHCMR} min varies 1:1 with V_{EE} , max varies 1:1 with V_{CC} .

MC10E457, MC100E457

Table 8. AC CHARACTERISTICS ($V_{CCx} = 5.0\text{ V}$; $V_{EE} = 0.0\text{ V}$ or $V_{CCx} = 0.0\text{ V}$; $V_{EE} = -5.0\text{ V}$ (Note 1))

Symbol	Characteristic	0°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
f_{MAX}	Maximum Toggle Frequency	1.1			1.1			1.1			GHz
t_{PLH} t_{PHL}	Propagation Delay to Output D (Differential) D (Single-Ended) SEL COMSEL	325 275 300 325	475 475 500 525	700 750 775 800	375 325 350 375	475 475 500 525	650 700 725 750	375 325 350 375	475 475 500 525	650 700 725 750	ps
t_{skew}	Within-Device Skew (Note 2)		40			40			40		ps
t_{skew}	Duty Cycle Skew (Note 3) $t_{PLH} - t_{PHL}$		± 10			± 10			± 10		ps
t_{JITTER}	Random Clock Jitter (rms)		<1.0			<1.0			<1.0		ps
V_{PP}	Input Voltage Swing (Differential Configuration)	150						150			mV
t_r/t_f	Rise/Fall Time 20–80%	125	275	500				150	275	450	ps

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

1. 10 Series: V_{EE} can vary $-0.46\text{ V} / +0.06\text{ V}$.
100 Series: V_{EE} can vary $-0.46\text{ V} / +0.8\text{ V}$.
2. Within-device skew is defined as identical transitions on similar paths through a device.
3. Duty cycle skew is defined only for differential operation when the delays are measured from the cross point of the inputs to the cross point of the outputs.

MC10E457, MC100E457

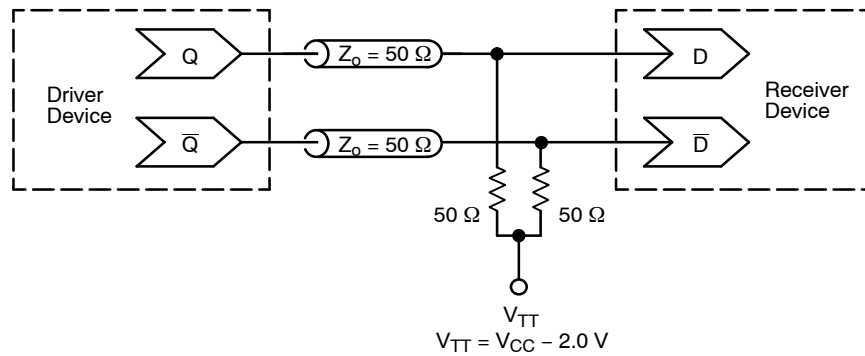


Figure 3. Typical Termination for Output Driver and Device Evaluation
(See Application Note [AND8020/D](#) – Termination of ECL Logic Devices)

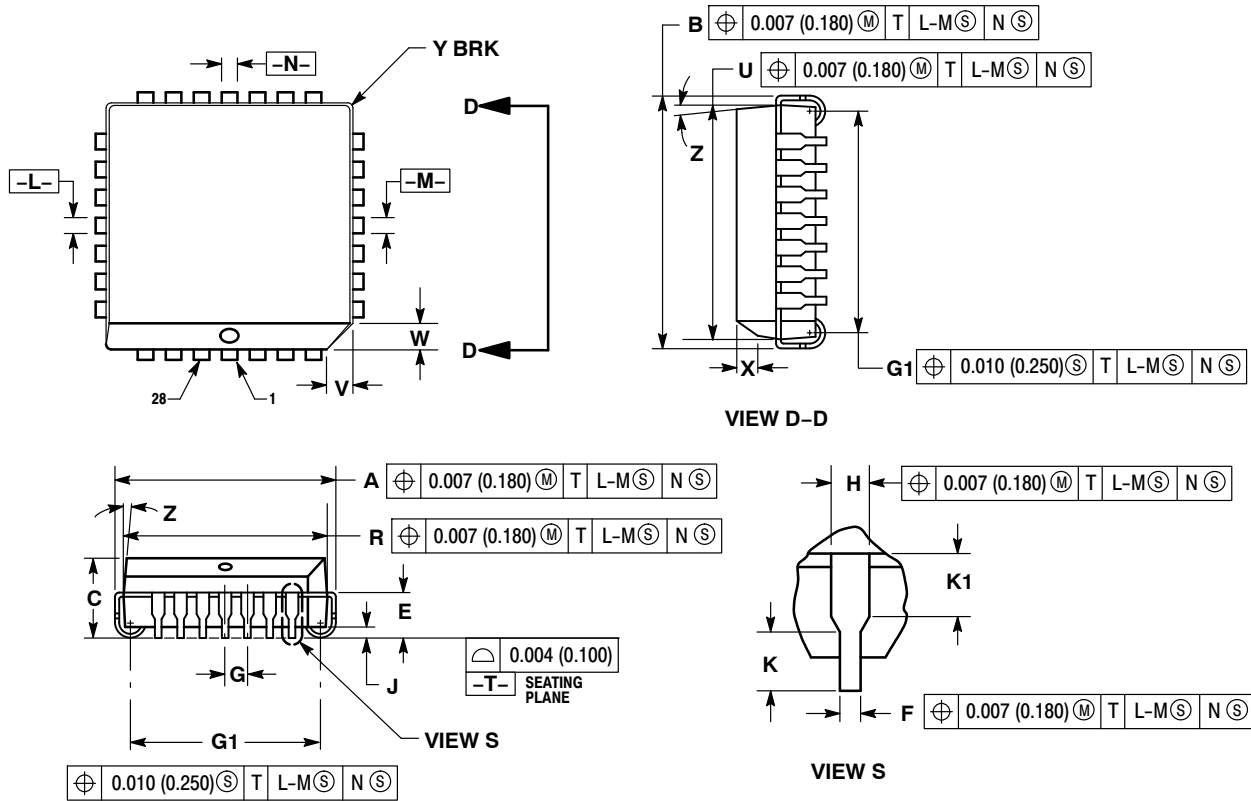
Resource Reference of Application Notes

- AN1405/D** – ECL Clock Distribution Techniques
- AN1406/D** – Designing with PECL (ECL at +5.0 V)
- AN1503/D** – ECLinPS™ I/O SPICE Modeling Kit
- AN1504/D** – Metastability and the ECLinPS Family
- AN1568/D** – Interfacing Between LVDS and ECL
- AN1672/D** – The ECL Translator Guide
- AND8001/D** – Odd Number Counters Design
- AND8002/D** – Marking and Date Codes
- AND8020/D** – Termination of ECL Logic Devices
- AND8066/D** – Interfacing with ECLinPS
- AND8090/D** – AC Characteristics of ECL Devices

MC10E457, MC100E457

PACKAGE DIMENSIONS

28 LEAD PLLC
FN SUFFIX
CASE 776-02
ISSUE F



NOTES:

- DATUMS $-L-$, $-M-$, AND $-N-$ DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
- DIMENSION $G1$, TRUE POSITION TO BE MEASURED AT DATUM $-T-$, SEATING PLANE.
- DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
- DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
- CONTROLLING DIMENSION: INCH.
- THE PACKAGE TOP MAY BE SMALLER THAN THE PACKAGE BOTTOM BY UP TO 0.012 (0.300). DIMENSIONS R AND U ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
- DIMENSION H DOES NOT INCLUDE DAMBAR PROTRUSION OR INTRUSION. THE DAMBAR PROTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE GREATER THAN 0.037 (0.940). THE DAMBAR INTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE SMALLER THAN 0.025 (0.635).

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.485	0.495	12.32	12.57
B	0.485	0.495	12.32	12.57
C	0.165	0.180	4.20	4.57
E	0.090	0.110	2.29	2.79
F	0.013	0.021	0.33	0.53
G	0.050 BSC		1.27 BSC	
H	0.026	0.032	0.66	0.81
J	0.020	---	0.51	---
K	0.025	---	0.64	---
R	0.450	0.456	11.43	11.58
U	0.450	0.456	11.43	11.58
V	0.042	0.048	1.07	1.21
W	0.042	0.048	1.07	1.21
X	0.042	0.056	1.07	1.42
Y	---	0.020	---	0.50
Z	2°	10°	2°	10°
G1	0.410	0.430	10.42	10.92
K1	0.040	---	1.02	---

MC10E457, MC100E457

ECLinPS is a trademark of Semiconductor Components Industries, LLC (SCILLC) or its subsidiaries in the United States and/or other countries.

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

Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

 [View MC10E457FNR2G on WIN SOURCE](#)

 [ON Semiconductor](#) Information

Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management