PRELIMINARY - July 25, 2000

TEL:805-498-2111 FAX:805-498-3804 WEB:http://www.semtech.com

DESCRIPTION

The SC1537 is designed to maintain a glitch-free 3.3V output when at least one of two inputs, 5V (VIN) and 3.3V (VAUX), is present.

Whenever VIN exceeds a predetermined threshold value, the internal 3.3V linear regulator is enabled, and DR is pulled high.

When VIN falls below a lower threshold value, DR is pulled low and the internal linear regulator is turned off. DR has been designed to drive the gate of an external low threshold P-channel MOSFET, which can be used to connect the 3.3V supply directly to the regulator output. This ensures an uninterrupted 3.3V output even if VIN falls out of specification. A maximum $R_{DS(ON)}$ of 100mΩ is recommended.

When both supplies are simultaneously available, the drive pin (DR) will be pulled High, turning off the external PMOS switch.

The internal 5V detector has its upper threshold (for VIN rising) set to 4.22V (typical) while the lower threshold (for VIN falling) is at 4.05V (typical) giving a hysteresis of approximately 170mV.

The SC1537 is available in the popular SO-8 and 5-lead TO-263 surface mount packages.

FEATURES

- Glitch-free transition between input sources
- Internal logic selects input source
- Gate drive for external PMOS bypass switch
- 5V detector with hysteresis
- 1% regulated output voltage accuracy
- 700mA load current capability
- SO-8 and TO-263 packages

APPLICATIONS

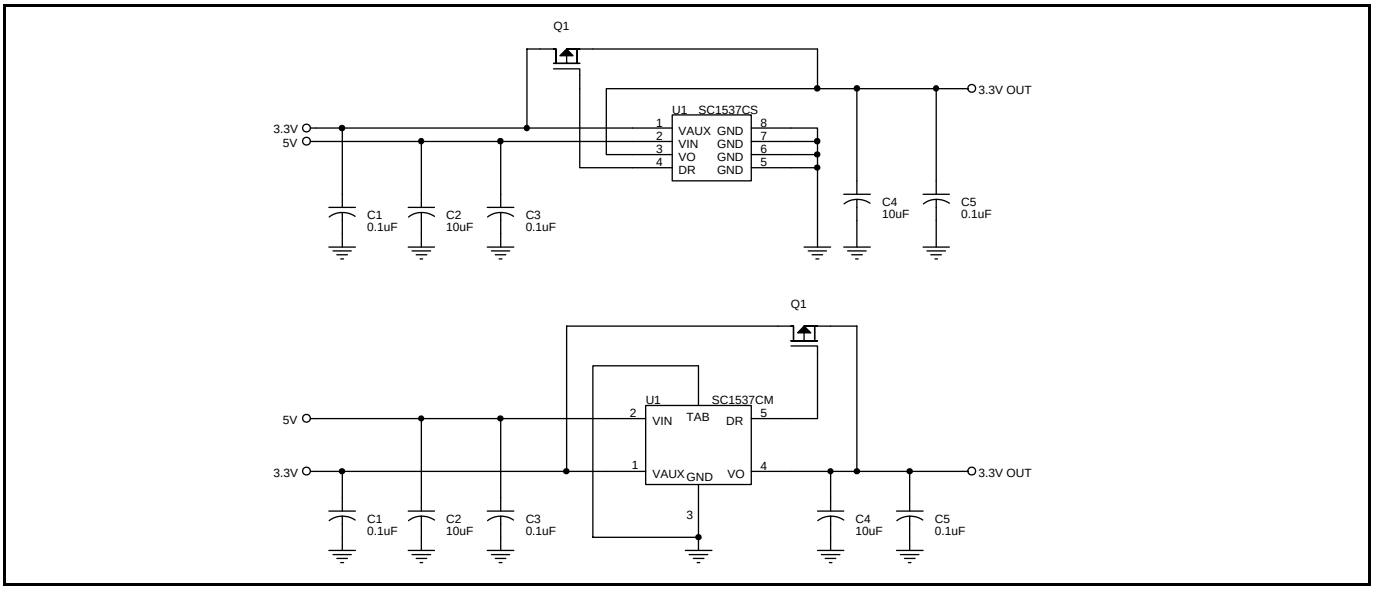
- Desktop Computers
- Network Interface Cards (NICs)
- PCMCIA/PCI Interface Cards
- Cardbus™ Technology
- Power supplies with multiple input sources

ORDERING INFORMATION

Part Number(1)	Package
SC1537CSTR	SO-8
SC1537CMTR	TO-263-5L

Note:
(1) Only available in tape and reel packaging. A reel contains 2500 devices for SO-8 and 800 devices for TO-263.

APPLICATION CIRCUIT



NOTE:
(1) External switch (Q1): use a low threshold P-channel MOSFET such as Vishay Si2305DS ($R_{DS(ON)}$ < 71mΩ at V_{GS} = 2.5V) or International Rectifier IRLML6401 ($R_{DS(ON)}$ < 85mΩ at V_{GS} = 2.5V), or equivalent.

652 MITCHELL ROAD NEWBURY PARK CA 91320

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ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Maximum	Units
Input Supply Voltage	VIN	-0.5 to +7	V
Auxiliary Supply Voltage	VAUX	-0.5 to +7	V
LDO Output Current	I_O	10 to 700	mA
Operating Ambient Temperature Range	T_A	0 to +70	°C
Operating Junction Temperature Range	T_J	0 to +125	°C
Storage Temperature Range	T_{STG}	-65 to +150	°C
Lead Temperature (Soldering) 10 Sec	T_{LEAD}	300	°C
Thermal Impedance Junction to Ambient SO-8(1) TO-263	θ_{JA}	 65 60	°C/W
Thermal Impedance Junction to Case SO-8 TO-263	θ_{JC}	 39 3	°C/W
ESD Rating (Human Body Model)	ESD	2	kV

Note:
(1) 1 inch square of 1/16" FR-4, double sided, 1 oz. minimum copper weight.

ELECTRICAL CHARACTERISTICS

Unless specified, T_A = 25°C, VIN = 5V, VAUX = 3.3V, I_O = 700mA, C_O = 10µF. Values in **bold** apply over full operating temperature range.

Parameter	Symbol	Test Conditions	MIN	TYP	MAX	Units
VIN						
Supply Voltage	VIN	VAUX = 0V	**4.75**	**5.00**	**5.25**	V
Quiescent Current	I_Q	VIN = 5V, VAUX = 0V, I_O = 0mA		9.0	14.0	mA
					16.0	
		VIN = 5V, VAUX = 3.3V, I_O = 0mA		13.0	17.0	mA
					18.0	
Reverse Leakage From VAUX	I_{VIN}	VAUX = 3.6V, VIN = 0V, I_O = 0mA		-1.5	-3.0	mA
					-4.0	
VAUX						
Supply Voltage	VAUX		**3.0**	**3.3**	**3.6**	V
Quiescent Current	$I_{Q(AUX)}$	VAUX = 3.3V, VIN = 0V, I_O = 0mA		8.0	11.0	mA
					13.0	
		VAUX = 3.3V, VIN = 5V, I_O = 0mA		1.5	2.5	mA
					3.0	

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ELECTRICAL CHARACTERISTICS

Unless specified, T_A = 25°C, VIN = 5V, VAUX = 3.3V, I_O = 700mA, C_O = 10µF. Values in **bold** apply over full operating temperature range.

Parameter	Symbol	Test Conditions	MIN	TYP	MAX	Unit
VAUX (Cont.)						
Reverse Leakage From VIN	I_{VAUX}	VIN = 5.5V, VAUX = 0V, I_O = 0mA		-5.0	-50.0	µA
					-100.0	
5V Detect(1)(2)(3)						
Low Threshold Voltage	$V_{TH(LO)}$	VIN Falling, I_O = 20mA	3.92	4.05	4.18	V
			3.90		**4.20**	
Hysteresis	V_{HYST}		90	170		mV
			80			
High Threshold Voltage	$V_{TH(HI)}$	VIN Rising, I_O = 20mA			**4.35**	V
VO						
LDO Output Voltage	VO	I_O = 20mA	3.267	3.300	3.333	V
		4.75V ≤ VIN ≤ 5.25V, 0mA ≤ I_O ≤ 700mA	**3.234**		**3.366**	
Output Current	I_O				**400**	mA
Line Regulation	$REG_{(LINE)}$	VIN = 4.75V to 5.25V		0.20	0.60	%
					0.80	
Load Regulation	$REG_{(LOAD)}$	I_O = 10mA to 700mA		0.6	1.0	%
					1.2	
Drive Output						
Drive Voltage	V_{DR}	4.75V ≤ VIN ≤ 5.25V, I_{DR} = 200µA	3.4	VIN - 0.8		V
			3.3			
		VIN < $V_{TH(LO)}$, I_{DR} = -200µA		35	150	mV
					250	
Peak Drive Current	$I_{DR(PK)}$	Sinking: VIN = 3.9V, V_{DR} = 1V;	7			mA
		Sourcing: VIN = 4.35V, VIN - V_{DR} = 2.5V	**6**			
Drive High Delay(1)(4)	t_{DH}	C_{DR} = 1.2nF, VIN ramping up, measured		0.5	1.0	µs
		from VIN = $V_{TH(HI)}$ to V_{DR} = 2V			**2.0**	
Drive Low Delay(1)(4)	t_{DL}	C_{DR} = 1.2nF, VIN ramping down, measured		0.5	1.0	µs
		from VIN = $V_{TH(LO)}$ to V_{DR} = 2V			**2.0**	

NOTES:
(1) Guaranteed by design.
(2) See 5V Detect Thresholds on page 5.
(3) Recommended source impedance for 5V supply: ≤ 0.07Ω. This will ensure that I_O x R_{SOURCE} < V_{HYST}, thus avoiding DR toggling during 5V detect threshold transitions.
(4) See Timing Diagram on page 5.

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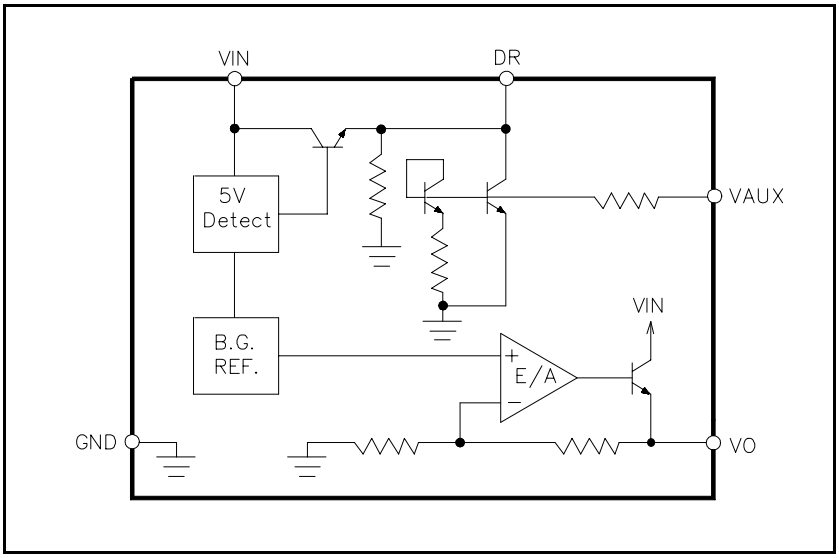
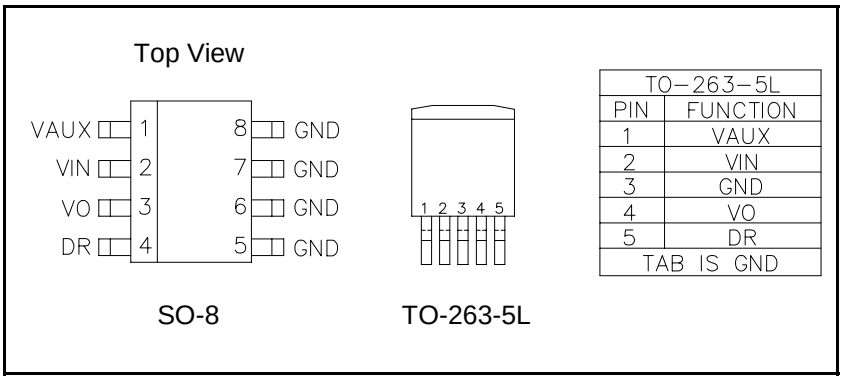
BLOCK DIAGRAM



PIN CONFIGURATION



TO−263−5L	
PIN	FUNCTION
1	VAUX
2	VIN
3	GND
4	VO
5	DR
TAB IS GND	

PIN DESCRIPTION

Pin Name	SO-8 Pin #	TO-263-5L Pin #	Pin Function
DR	4	5	Driver output for external P-channel MOSFET pass element.
GND	5,6,7,8	3/TAB	Logic and power ground.
VAUX	1	1	This is the auxiliary input supply, nominally 3.3V.
VIN	2	2	This is the main input supply for the IC, nominally 5V.
VO	3	4	LDO 3.3V output.

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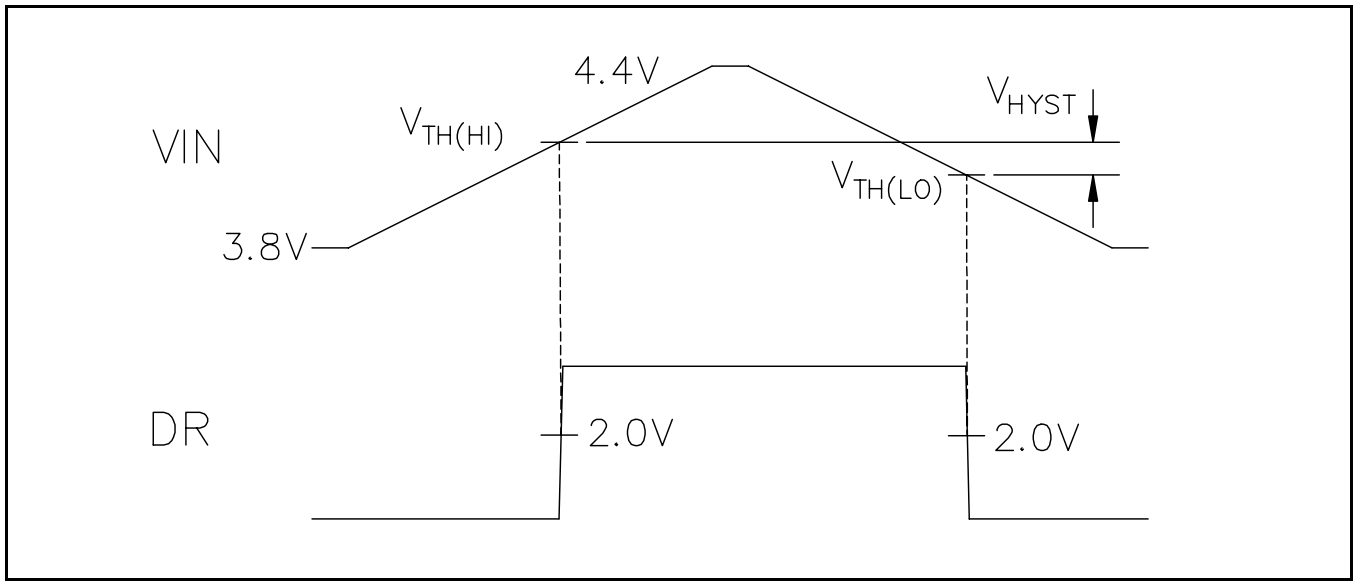
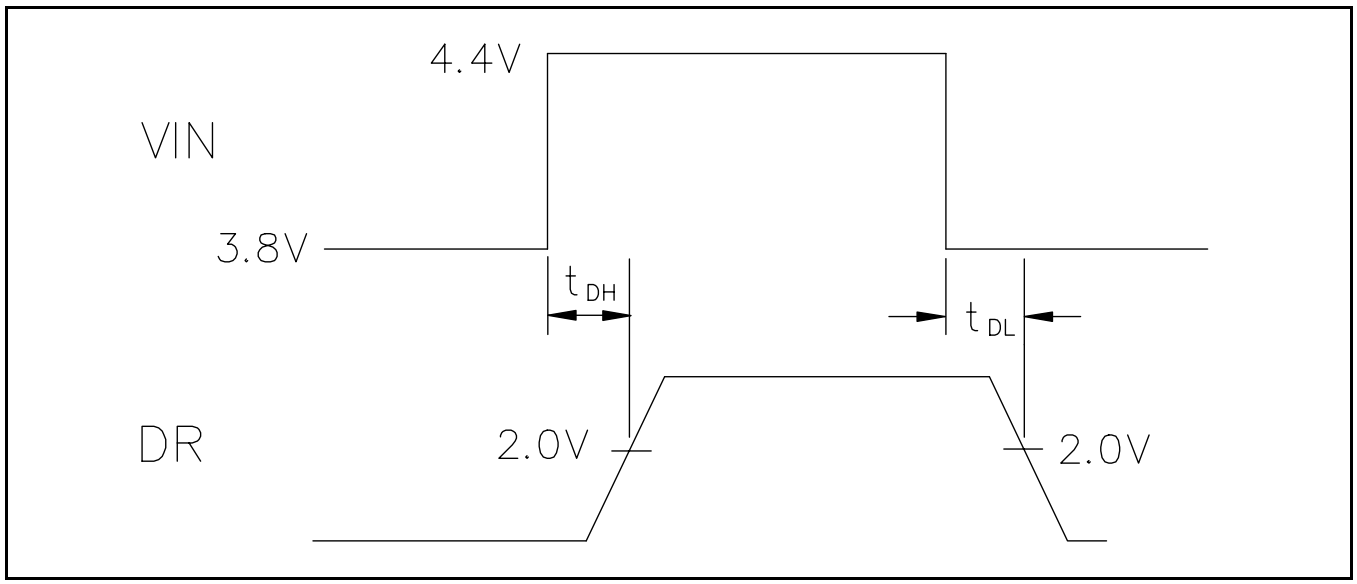
5V DETECT THRESHOLDS



NOTE:
(1) VIN rise and fall times (10% to 90%) to be ≥ 100µs.

TIMING DIAGRAM



NOTE:
(1) VIN rise and fall times (10% to 90%) to be ≤ 100ns.

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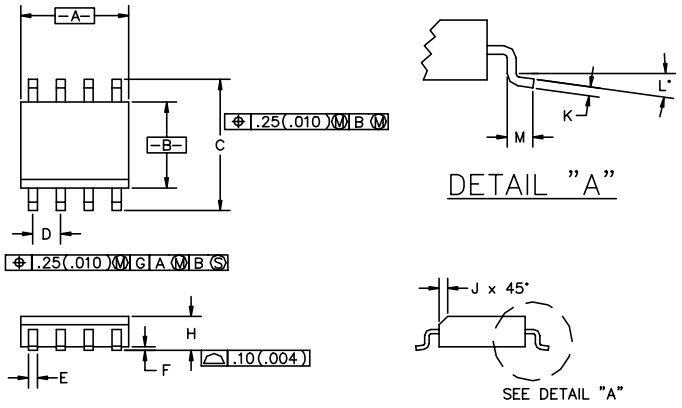
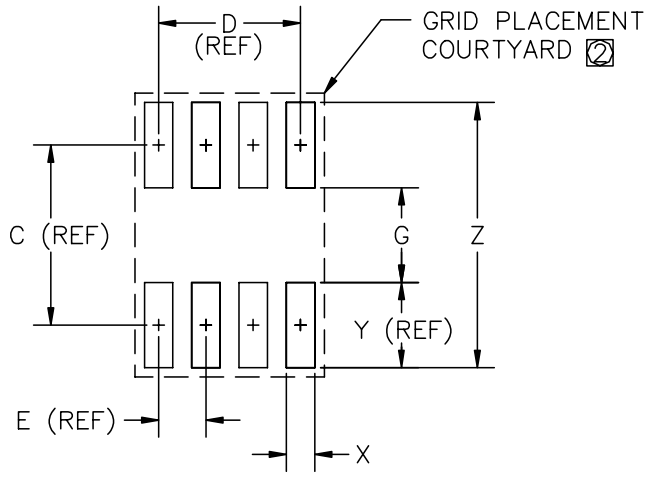
OUTLINE DRAWING - SO-8



JEDEC
REF: MS-012AA

DIMENSIONS					
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.188	.197	4.80	5.00	
B	.149	.158	3.80	4.00	
C	.228	.244	5.80	6.20	
D	.050	BSC	1.27	BSC	
E	.013	.020	0.33	0.51	
F	.004	.010	0.10	0.25	
H	.053	.069	1.35	1.75	
J	.011	.019	0.28	0.48	
K	.007	.010	.19	.25	
L	0°	8°	0°	8°	
M	.016	.050	0.40	1.27	

MINIMUM LAND PATTERN - SO-8



DIMENSIONS (1)					
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
C	–	.19	–	5.00	–
D	–	.15	–	3.81	–
E	–	.05	–	1.27	–
G	.10	.11	2.60	2.80	–
X	.02	.03	.60	.80	–
Y	–	.09	–	2.40	–
Z	–	.29	7.20	7.40	–

(2) GRID PLACEMENT COURTYARD IS 12x16 ELEMENTS (6 mm X 8mm) IN ACCORDANCE WITH THE INTERNATIONAL GRID DETAILED IN IEC PUBLICATION 97.

(1) CONTROLLING DIMENSION: MILLIMETERS

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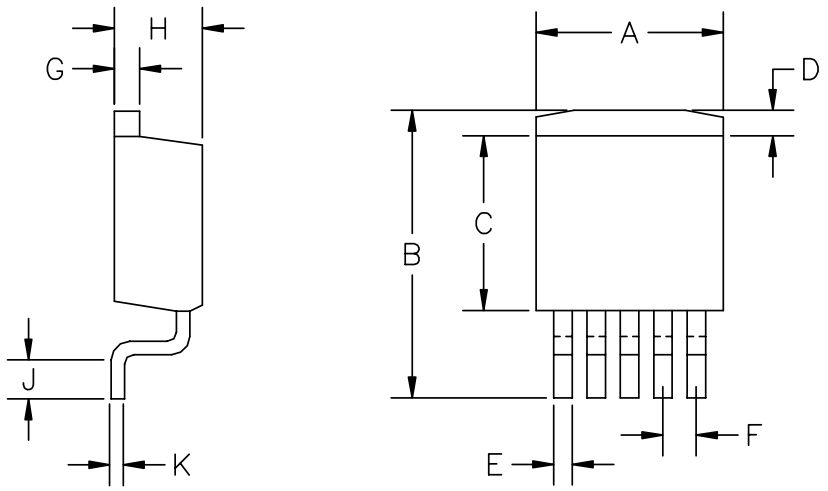
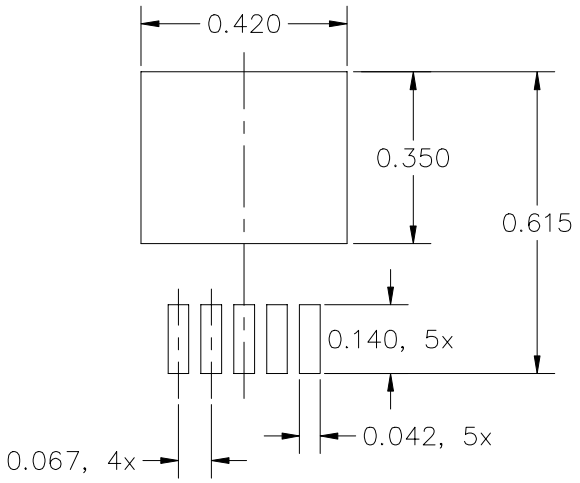
DEVICE OUTLINE - TO-263, 5 PIN



DIMENSIONS					
DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	.380	.405	9.65	10.29	—
B	.575	.625	14.60	15.88	—
C	.325	.380	8.25	9.66	—
D	—	.055	—	1.40	—
E	.020	.039	.50	.99	—
F	.060	.072	1.52	1.83	—
G	.045	.055	1.14	1.40	—
H	.160	.190	4.06	4.83	—
J	.090	.110	2.28	2.80	—
K	.018	.029	.457	.736	—

JEDEC TO-263

MINIMUM LAND PATTERN - TO-263, 5 PIN



NOTE: ALL DIMENSIONS ARE IN INCHES

ECN00-1177