

General Description

This 78Lxx series are fixed-voltage monolithic integrated-circuit voltage regulators are designed for a wide range of applications. These applications include on-card regulation for elimination of noise and distribution problems associated with single-point regulation. In addition, they can be used with power-pass elements to make high-current voltage regulators. Each of these regulators can deliver up to 100 mA of output current.

The internal limiting and thermal shutdown features of these regulators make them essentially immune to overload.

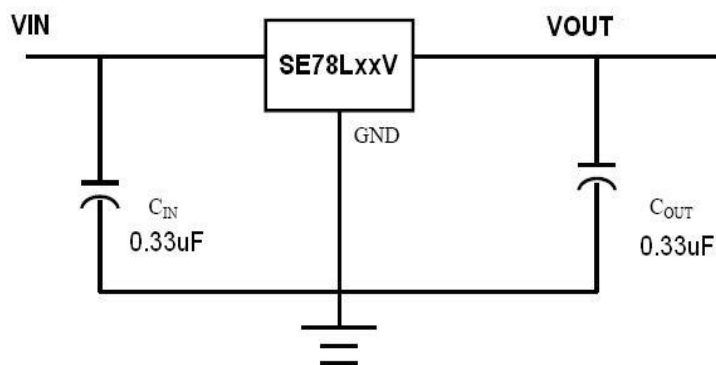
Features

- 3-Terminal Regulators
- Output Current Up to 100 mA
- Internal Thermal Overload Protection
- Internal Short-Circuit Limiting

Application

- Linear Regulator
- Graphic Card
- Adapter
- Charger
- Consumer Electronics

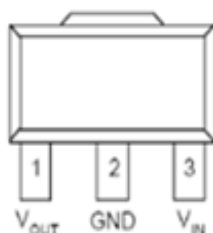
Typical Application



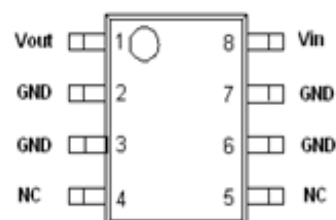
Pin Configuration



TO-92 (Top View)



SOT-89 (Front View)



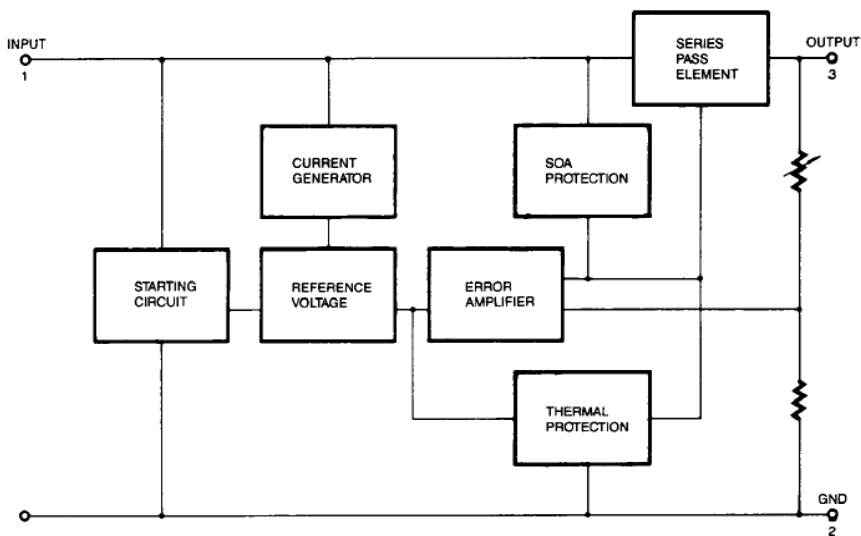
SOP-8 (Top View)



Pin Description

Pin Name	Pin Function Description
V_{IN}	Input voltage
GND	Ground
V_{OUT}	Output voltage

Functional Block Diagram



Ordering Information

Part Number	Marking Information	Package	Remarks
SE78LxxVT	SE78LxxV YYWW-LF	TO-92	XX means Output Voltage, YYWW means Production batch LF means Lead-free
SE78LxxVK		SOT-89	
SE78LxxVF		SOP-8	

Absolute Maximum Ratings

Symbol	Parameter	Value			Units
		78L05V~78L10V	78L12V~78L18V	78L24V	
V_{IN}	Input voltage	30	35	40	V
I_{OUT}	Output current	100			mA
T_A	Operating ambient temperature	-40~125			°C
T_J	Operating junction temperature	150 (TO-92)			°C/W
T_{STG}	Storage Temperature	-65~150			°C
T_{LEAD}	Lead Temperature 1.6mm from case for 10 seconds	260			°C



Recommended Operating Conditions

Symbol	Parameter		Min	Max	Unit
V _{in}	Input Voltage	78L05V	7	20	V
		78L06V	8	20	
		78L08V	10.5	23	
		78L09V	11.5	24	
		78L10V	12.5	25	
		78L12V	14.5	27	
		78L15V	17.5	30	
		78L18V	20.5	33	
		78L24V	26.5	39	
I _{OUT}	Output Current			100	mA
T _J	Operating virtual junction temperature		0	125	°C

■ 78L05V Electrical Characteristics

V_{in}=10V, I_{out}=40mA , T_A = 25°C (unless otherwise noted)

	Symbol	Test Conditions	Min	Typ	Max	Unit
V _{out}	Output voltage		4.8	5	5.2	V
		I _{out} = 1 mA to 40 mA, V _{in} = 7V to 20V	4.75	5	5.25	
		I _{out} = 1 mA to 70mA	4.75	5	5.25	
REG _{line}	Input regulation	V _{in} = 7V to 20V		32	150	mV
		V _{in} = 8V to 20V		26	100	
REG _{load}	Output regulation	I _{out} = 1 mA to 40mA		8	30	mV
		I _{out} = 1 mA to 100mA		15	60	
PSRR	Ripple rejection	V _{in} = 8V to 18V, f= 120Hz	41	49		dB
V _n	Output noise voltage	f = 10Hz to 100 KHz		42		uV
V _{DROPOUT}	Dropout voltage			1.7		V
I _Q	Bias current			3.8	6	mA
ΔI _Q	Bias current change	V _{in} = 8V to 20V		1.5		
		I _{out} = 1 mA to 40mA			0.1	

■ 78L06V Electrical Characteristics

$V_{in}=11V$, $I_{out}=40mA$, $T_A = 25^{\circ}C$ (unless otherwise noted)

	Symbol	Test Conditions	Min	Typ	Max	Unit
V _{out}	Output voltage		5.75	6	6.25	V
		$I_{out}= 1\text{ mA to }40\text{ mA}$, $V_{in} = 8V\text{ to }20V$	5.7	6	6.3	
		$I_{out}= 1\text{ mA to }70mA$	5.7	6	6.3	
REG _{line}	Input regulation	$V_{in} = 8V\text{ to }20V$		35	175	mV
		$V_{in} = 9V\text{ to }20V$		29	125	
REG _{load}	Output regulation	$I_{out}= 1\text{ mA to }40mA$		9	40	mV
		$I_{out} = 1\text{ mA to }100mA$		16	80	
PSRR	Ripple rejection	$V_{in} = 9V\text{ to }19V$, $f= 120Hz$	40	48		dB
V _n	Output noise voltage	$f = 10Hz\text{ to }100\text{ KHz}$		46		uV
V _{DROPOUT}	Dropout voltage			1.7		V
I _Q	Bias current			3.9	6	mA
ΔI_Q	Bias current change	$V_{in} = 9V\text{ to }20V$		1.5		
		$I_{out}= 1\text{ mA to }40mA$			0.1	

■ 78L08V Electrical Characteristics

$V_{in}=14V$, $I_{out}=40mA$, $T_A = 25^{\circ}C$ (unless otherwise noted)

	Symbol	Test Conditions	Min	Typ	Max	Unit
V _{out}	Output voltage		7.7	8	8.3	V
		$I_{out}= 1\text{ mA to }40\text{ mA}$, $V_{in} = 7V\text{ to }20V$	7.6	8	8.4	
		$I_{out}= 1\text{ mA to }70mA$	7.6	8	8.4	
REG _{line}	Input regulation	$V_{in} = 10.5V\text{ to }23V$		42	175	mV
		$V_{in} = 11V\text{ to }23V$		36	125	
REG _{load}	Output regulation	$I_{out}= 1\text{ mA to }40mA$		10	40	mV
		$I_{out} = 1\text{ mA to }100mA$		18	80	
PSRR	Ripple rejection	$V_{in} = 13V\text{ to }23V$, $f= 120Hz$	37	46		dB
V _n	Output noise voltage	$f = 10Hz\text{ to }100\text{ KHz}$		54		uV
V _{DROPOUT}	Dropout voltage			1.7		V
I _Q	Bias current			4	6	mA
ΔI_Q	Bias current change	$V_{in} = 11V\text{ to }23V$		1.5		
		$I_{out}= 1\text{ mA to }40mA$			0.1	

■ 78L09V Electrical Characteristics

$V_{in}=16V$, $I_{out}=40mA$, $T_A = 25^{\circ}C$ (unless otherwise noted)

	Symbol	Test Conditions	Min	Typ	Max	Unit
V _{out}	Output voltage		8.6	9	9.4	V
		$I_{out}= 1\text{ mA to }40\text{ mA}$, $V_{in}=12V\text{ to }24V$	8.55	9	9.45	
		$I_{out}= 1\text{ mA to }70mA$	8.55	9	9.45	
REG _{line}	Input regulation	$V_{in} = 12V\text{ to }24V$		45	175	mV
		$V_{in} = 13V\text{ to }24V$		40	125	
REG _{load}	Output regulation	$I_{out}= 1\text{ mA to }40mA$		11	40	mV
		$I_{out} = 1\text{ mA to }100mA$		8	30	
PSRR	Ripple rejection	$V_{in} = 15V\text{ to }25V$, $f= 120Hz$	38	45		dB
V _n	Output noise voltage	$f = 10Hz\text{ to }100\text{ KHz}$		58		uV
V _{DROPOUT}	Dropout voltage			1.7		V
I _Q	Bias current			4.1	6	mA
ΔI_Q	Bias current change	$V_{in} = 13V\text{ to }24V$		1.5		
		$I_{out}= 1\text{ mA to }40mA$			0.1	

■ 78L10V Electrical Characteristics

$V_{in}=17V$, $I_{out}=40mA$, $T_A = 25^{\circ}C$ (unless otherwise noted)

	Symbol	Test Conditions	Min	Typ	Max	Unit
V _{out}	Output voltage		9.6	10	10.4	V
		$I_{out}= 1\text{ mA to }40\text{ mA}$, $V_{in} = 13V\text{ to }25V$	9.5	10	10.5	
		$I_{out}= 1\text{ mA to }70mA$	9.5	10	10.5	
REG _{line}	Input regulation	$V_{in} = 13V\text{ to }25V$		51	175	mV
		$V_{in} = 14V\text{ to }25V$		42	125	
REG _{load}	Output regulation	$I_{out}= 1\text{ mA to }40mA$		11	40	mV
		$I_{out} = 1\text{ mA to }100mA$		20	90	
PSRR	Ripple rejection	$V_{in} = 15V\text{ to }25V$, $f= 120Hz$	37	44		dB
V _n	Output noise voltage	$f = 10Hz\text{ to }100\text{ KHz}$		62		uV
V _{DROPOUT}	Dropout voltage			1.7		V
I _Q	Bias current			3.8	6	mA
ΔI_Q	Bias current change	$V_{in} = 14V\text{ to }25V$		1.5		
		$I_{out}= 1\text{ mA to }40mA$			0.1	



■ 78L12V Electrical Characteristics

$V_{in}=19V$, $I_{out}=40mA$, $T_A = 25^{\circ}C$ (unless otherwise noted)

	Symbol	Test Conditions	Min	Typ	Max	Unit
V _{out}	Output voltage		11.5	12	12.5	V
		$I_{out}= 1\text{ mA to }40\text{ mA}$, $V_{in} = 14V\text{ to }27V$	11.4	12	12.6	
		$I_{out}= 1\text{ mA to }70mA$	11.4	12	12.6	
REG _{line}	Input regulation	$V_{in} = 14V\text{ to }27V$		55	250	mV
		$V_{in} = 16V\text{ to }27V$		49	200	
REG _{load}	Output regulation	$I_{out}= 1\text{ mA to }40mA$		13	50	mV
		$I_{out} = 1\text{ mA to }100mA$		22	100	
PSRR	Ripple rejection	$V_{in} = 15V\text{ to }25V$, $f= 120Hz$	37	42		dB
V _n	Output noise voltage	$f = 10Hz\text{ to }100\text{ KHz}$		70		uV
V _{DROPOUT}	Dropout voltage			1.7		V
I _Q	Bias current			4.3	6.5	mA
ΔI _Q	Bias current change	$V_{in} = 16V\text{ to }27V$		1.5		
		$I_{out}= 1\text{ mA to }40mA$			0.1	

■ 78L15V Electrical Characteristics

$V_{in}=23V$, $I_{out}=40mA$, $T_A = 25^{\circ}C$ (unless otherwise noted)

	Symbol	Test Conditions	Min	Typ	Max	Unit
V _{out}	Output voltage		14.4	15	15.6	V
		$I_{out}= 1\text{ mA to }40\text{ mA}$, $V_{in} = 17.5V\text{ to }30V$	14.25	15	15.75	
		$I_{out}= 1\text{ mA to }70mA$	14.25	15	15.75	
REG _{line}	Input regulation	$V_{in} = 17.5V\text{ to }30V$		65	300	mV
		$V_{in} = 19V\text{ to }30V$		58	250	
REG _{load}	Output regulation	$I_{out}= 1\text{ mA to }40mA$		15	75	mV
		$I_{out} = 1\text{ mA to }100mA$		25	150	
PSRR	Ripple rejection	$V_{in} = 18.5V\text{ to }28V$, $f= 120Hz$	34	39		dB
V _n	Output noise voltage	$f = 10Hz\text{ to }100\text{ KHz}$		82		uV
V _{DROPOUT}	Dropout voltage			1.7		V
I _Q	Bias current			4.6	6.5	mA
ΔI _Q	Bias current change	$V_{in} = 19V\text{ to }30V$		1.5		
		$I_{out}= 1\text{ mA to }40mA$			0.1	

■ 78L18V Electrical Characteristics

$V_{in}=26V$, $I_{out}=40mA$, $T_A = 25^{\circ}C$ (unless otherwise noted)

	Symbol	Test Conditions	Min	Typ	Max	Unit
V _{out}	Output voltage		17.3	18	18.7	V
		$I_{out}= 1\text{ mA to }40\text{ mA}$, $V_{in} = 20.5V\text{ to }33V$	17.1	18	18.9	
		$I_{out}= 1\text{ mA to }70mA$	17.1	18	18.9	
REG _{line}	Input regulation	$V_{in} = 20.5V\text{ to }33V$		70	360	mV
		$V_{in} = 22V\text{ to }33V$		64	300	
REG _{load}	Output regulation	$I_{out}= 1\text{ mA to }40mA$		19	90	mV
		$I_{out} = 1\text{ mA to }100mA$		27	180	
PSRR	Ripple rejection	$V_{in} = 21.5V\text{ to }31.5V$, $f = 120Hz$	32	36		dB
V _n	Output noise voltage	$f = 10Hz\text{ to }100\text{ KHz}$		89		uV
V _{DROPOUT}	Dropout voltage			1.7		V
I _Q	Bias current			4.7	6.5	mA
ΔI_Q	Bias current change	$V_{in} = 22V\text{ to }33V$		1.5		
		$I_{out}= 1\text{ mA to }40mA$			0.1	

■ 78L24V Electrical Characteristics

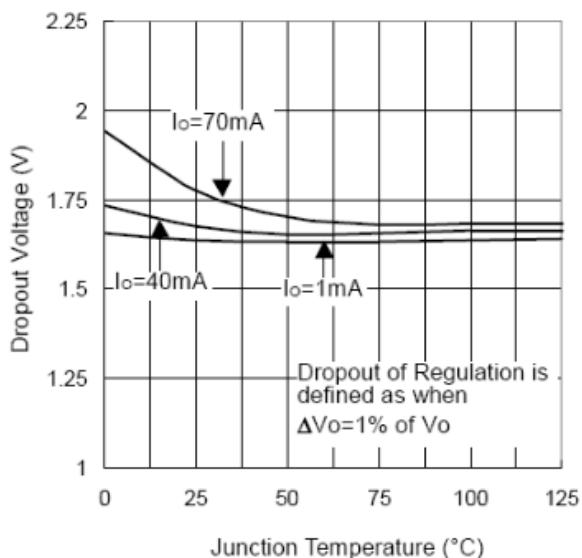
$V_{in}=32V$, $I_{out}=40mA$, $T_A = 25^{\circ}C$ (unless otherwise noted)

	Symbol	Test Conditions	Min	Typ	Max	Unit
V _{out}	Output voltage		23	24	25	V
		$I_{out}= 1\text{ mA to }40\text{ mA}$, $V_{in} = 26.5V\text{ to }39V$	22.8	24	25.2	
		$I_{out}= 1\text{ mA to }70mA$	22.8	24	25.2	
REG _{line}	Input regulation	$V_{in} = 26.5V\text{ to }39V$		95	480	mV
		$V_{in} = 29V\text{ to }39V$		78	400	
REG _{load}	Output regulation	$I_{out}= 1\text{ mA to }40mA$		28	120	mV
		$I_{out} = 1\text{ mA to }100mA$		41	240	
PSRR	Ripple rejection	$V_{in} = 27.5V\text{ to }37.5V$, $f = 120Hz$	30	33		dB
V _n	Output noise voltage	$f = 10Hz\text{ to }100\text{ KHz}$		97		uV
V _{DROPOUT}	Dropout voltage			1.7		V
I _Q	Bias current			4.8	6.5	mA
ΔI_Q	Bias current change	$V_{in} = 28V\text{ to }39V$		1.5		
		$I_{out}= 1\text{ mA to }40mA$			0.1	

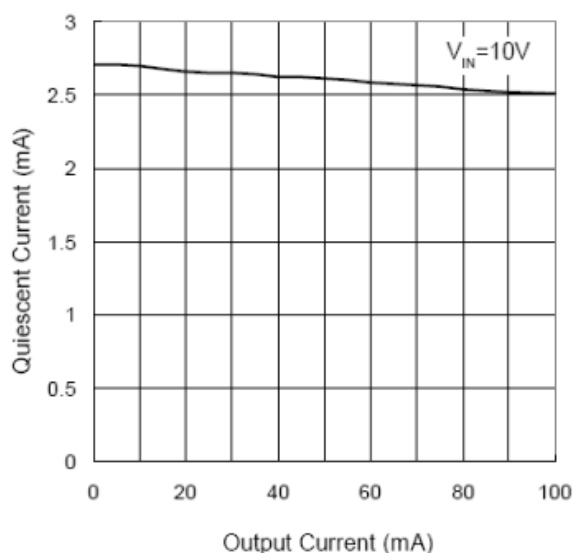


Typical Performance Characteristics(78L05V)

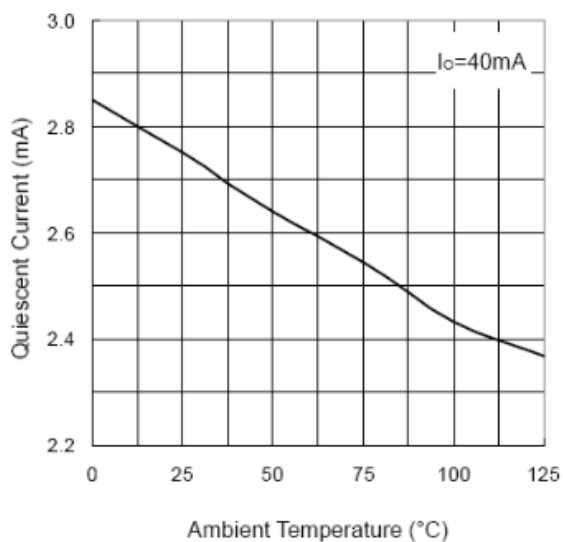
Dropout Voltage vs. Junction Temperature



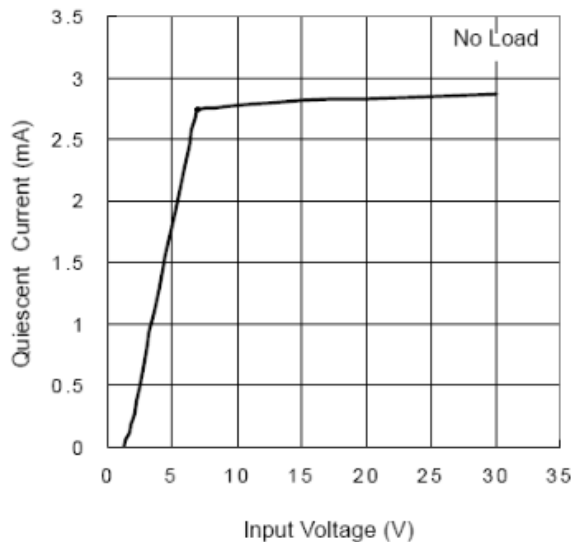
Quiescent Current vs. Output Current



Quiescent Current vs. Ambient Temperature

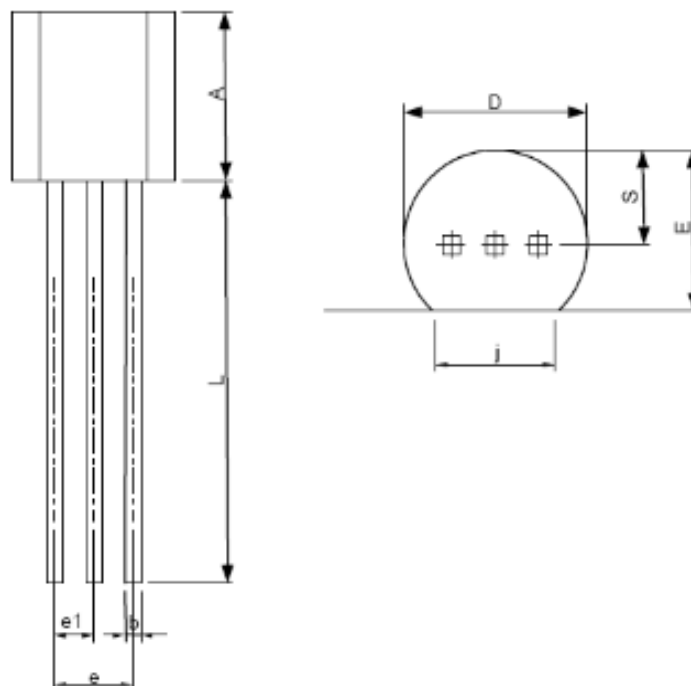


Quiescent Current vs. Input Voltage



Outline Drawing

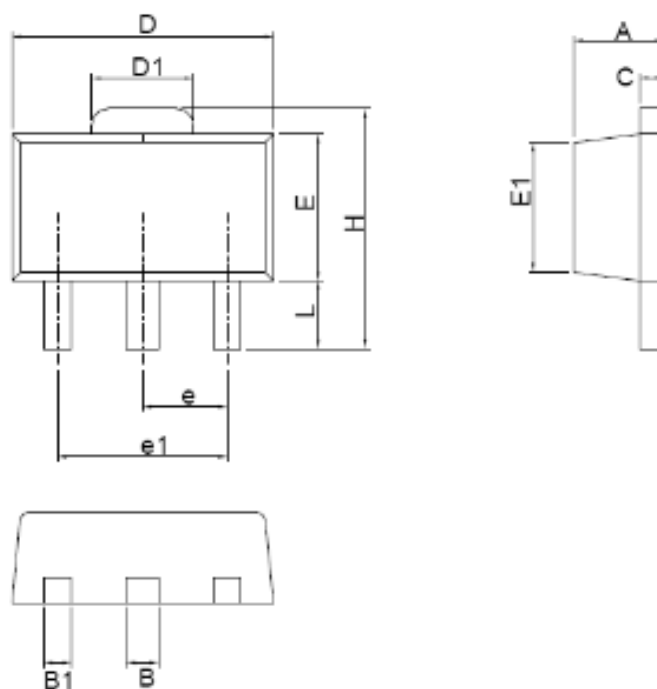
TO-92



SYMBOL	TO-92			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.32	5.33	0.170	0.210
b	0.41	0.53	0.016	0.021
D	4.45	5.20	0.175	0.205
E	3.18	4.19	0.125	0.165
e	2.42	2.68	0.095	0.105
e1	1.15	1.39	0.045	0.055
j	3.43	4.00	0.135	0.157
L	12.70	15.00	0.500	0.591
S	2.03	2.66	0.080	0.105



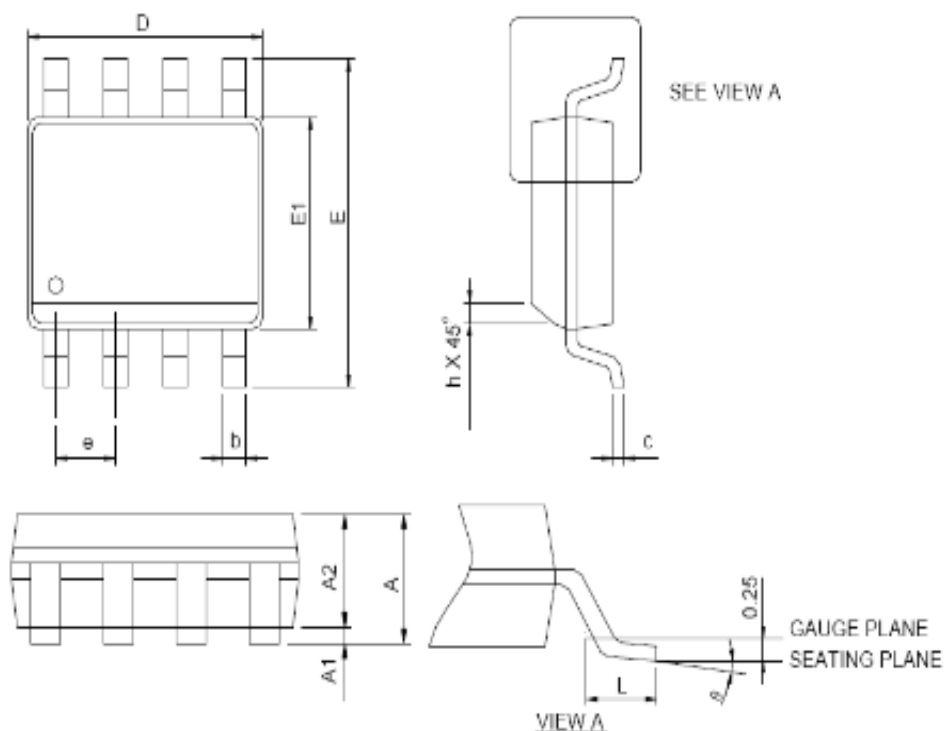
SOT-89



SYMBOL	SOT-89			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	1.40	1.60	0.055	0.063
B	0.44	0.56	0.017	0.022
B1	0.36	0.48	0.014	0.019
C	0.35	0.44	0.014	0.017
D	4.40	4.60	0.173	0.181
D1	1.62	1.83	0.064	0.072
E	2.29	2.60	0.090	0.102
E1	2.13	2.29	0.084	0.090
e	1.50 BSC		0.059 BSC	
e1	3.00 BSC		0.118 BSC	
H	3.94	4.25	0.155	0.167
L	0.89	1.20	0.035	0.047



SOP-8



SYMBOL	SOP-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A		1.75		0.069
A1	0.10	0.25	0.004	0.010
A2	1.25		0.049	
b	0.31	0.51	0.012	0.020
c	0.17	0.25	0.007	0.010
D	4.80	5.00	0.189	0.197
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
h	0.25	0.50	0.010	0.020
L	0.40	1.27	0.016	0.050
Ø	0°	8°	0°	8°

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