Preliminary – **LD6722**

1.2A Step-down/ Step-up/ Inverting DC-to-DC Converter

Features

- Operation from 3.0 V to 40 V input
- Low standby current
- Current limiting
- Output switch current up to 1.2 A
- Adjustable output voltage
- Operation at frequencies up to 180KHz
- Precision reference (2%)

Applications

- Battery Chargers
- NICs/Switches/Hubs
- ADSL Modems
- Negative Voltage Power Supplies

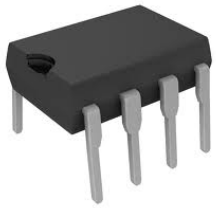
General Description

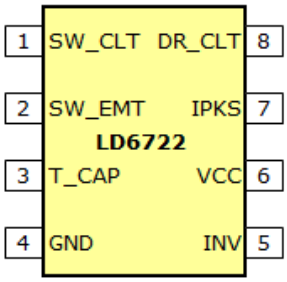
The LD6722 is a monolithic switching regulator control circuit containing the primary functions required for DC-DC converters. This device consists of internal temperature compensated reference, voltage comparator, controlled duty cycle oscillator with active current limit circuit, driver and high current output switch. The device is specifically designed to be used in Step-Down, Step-Up and Voltage-Inverting applications with a minimum number of external components.

The LD6722 is able to work in higher frequency.

The LD6722 is available in 2 packages: DIP-8 and SOP-8.

Package Pin Out





Ordering Information

		Packing Options	
Part No.	Package	Tube (TU)	Tape & Reel (TR)
LD6722	DIP-8	LD6722D1-TU	LD6722D1-TR
	SOP-8	LD6722S1-TU	LD6722S1-TR

- Package material default is “Green” package.

Product Marking

LD8888
SSSSS…
●

- ✧ Line 1 – “LD” is a fixed character
  8888: product name
- ✧ Line 2 – SSSSS…: lot number

Pin Definition

Pin#	Pin	Pin Name	Pin Description
1	SW_CLT	Switch Collector	Internal switch transistor collector
2	SW_EMT	Switch Emitter	Internal switch transistor emitter
3	T_CAP	Timing Capacitor	Timing Capacitor to control the switching frequency
4	GND	GND	Ground pin for all internal circuits
5	INV	Inverting Input	Inverting input pin for internal comparator
6	VCC	VCC	Voltage supply
7	IPKS	IPK Sense	Peak Current Sense Input by monitoring the voltage drop across an external I sense resistor to limit the peak current through the switch
8	DR_CLT	Driver Collector	Voltage driver collector

Absolute Maximum Ratings

Parameter		Maximum	Unit
V_{CC} power supply voltage		40	V
V_{IR} comparator input voltage		-0.3 to +40	V
$V_{C(SW)}$, $V_{E(SW)}$, $V_{CE(SW)}$, and $V_{C(DR)}$ voltage		40	V
Driver collector current *1		100	mA
I_{SW} switch current		1.2	A
P_D Power Dissipation T_A=25°C	DIP-8	1.25	W
	SOP-8	0.625	
$R_{\theta JA}$ Thermal Resistance	DIP-8	100	°C/W
	SOP-8	160	
T_J Operating junction temperature		150	°C
T_A Operating ambient temperature range		-40 to +85	°C
T_{STG} Storage temperature range		-65 to +150	°C

The values beyond the boundaries of absolute maximum rating may cause the damage to the device. Functional operation in this context is not implied. Continuous use of the device at the absolute rating level might influence device reliability. All voltages have their reference to device ground.

Electrical Characteristics*1

V_{CC}=5.0V, -40°C≦T_A≦+85°C unless specified

Parameter	Symbol	Condition	Min	Typ.	Max	Unit
Oscillator						
Frequency	F_{OSC}	V_{Pin5}=0V, C_T=1.0nF, T_A=25°C	30	38	45	kHz
Charge current	I_{CHG}	V_{CC}=5.0V to 40V, T_A=25°C	30	38	45	μA
Discharge current	I_{DISCHG}	V_{CC}=5.0V to 40V, T_A=25°C	180	240	290	μA
Discharge-to-charge current ratio	Ratio	I_{DISCHG}/I_{CHG}, Pin7 to V_{CC}, T_A=25°C	5.2	6.5	7.5	–
Current limit sense voltage	V_{PKSLMT}	$I_{CHG}=I_{DISCHG}$, T_A=25°C	250	300	350	mV
Output Switch *2						
Saturation voltage, Darlington connection	V_{CESAT}	I_{Sw}=1.0A, Pins1, 8 connected	–	1.0	1.3	V
		I_{Sw}=1.0A, R_{Pin8}=82Ω to V_{CC}, forced β =20	–	0.45	0.8	
DC current gain	hfe	I_{Sw}=1.0A, V_{CE}=5.0, T_A=25°C	50	75	–	–
Collector off-state current	$I_{C(OFF)}$	V_{CE}=40V	–	0.01	100	μA
Comparator						
Threshold voltage	V_{TH}	–	1.225	1.25	1.275	V
		*3	1.210	–	1.290	
Threshold voltage line regulation	R_{LINE}	V_{CC}=3.0V to 40V	–	1.4	5.0	mV
Input bias current	I_{IB}	V_{in}=0V	–	-20	-400	nA
Total Device						
Supply current	I_{CC}	V_{CC}=5.0V to 40V, C_T=1.0nF, V_{Pin7} =V_{CC}, V_{Pin5}>V_{TH}, V_{Pin2} =GND, other pins - open	–	–	4.0	mA

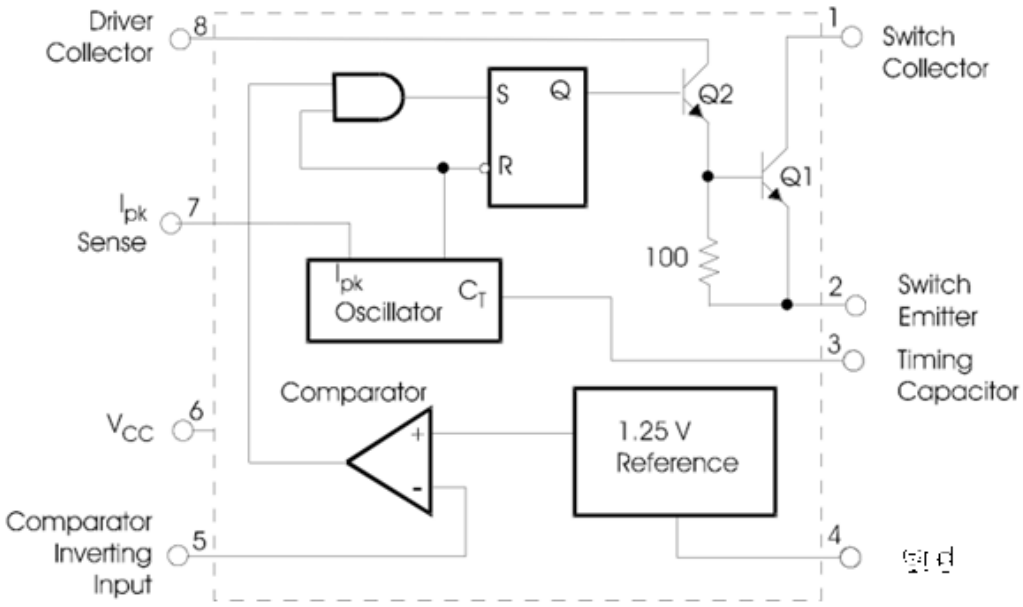
Notes:

1. Stresses greater than those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “Recommended Operating Conditions” are not implied. Exposure to “Absolute Maximum Ratings” for extended periods may affect device reliability.
2. Maximum package power dissipation limits must be observed.
3. Low duty cycle pulse technique are used during test to maintain junction temperature as close to ambient temperature as possible.
4. If the output switch is driven into hard saturation (non-Darlington configuration) at low switch currents (≦300mA) and high driver currents (≧30mA), it may take up to 2.0μs for it to come out of saturation. This condition will shorten the off time at frequencies 30 KHz, and is magnified at high temperatures. This condition does not occur with a Darlington configuration, since the output switch cannot saturate. If a non-Darlington configuration is used, the following output drive condition is recommended:

Forced β of output switch: $\frac{I_{C(OUTPUT)}}{I_{C(DRIVER)} \quad -7.0mA\ *} \geqq 10$

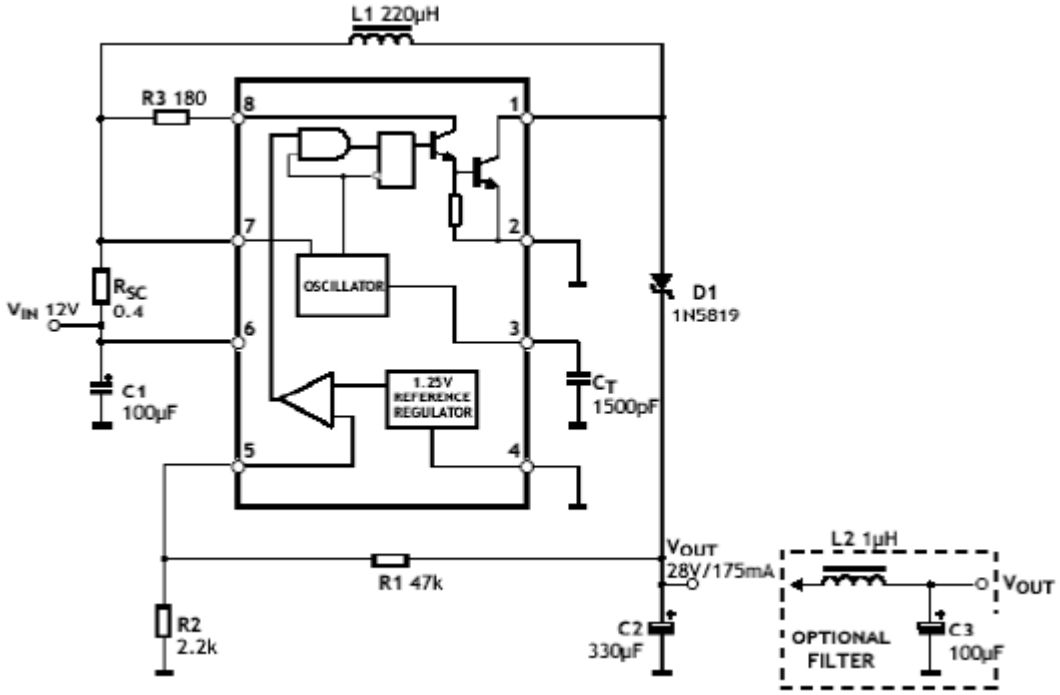
* The 10Ω resistor in the emitter of the driver device requires about 7 mA before the output switch conducts.

Block Diagram



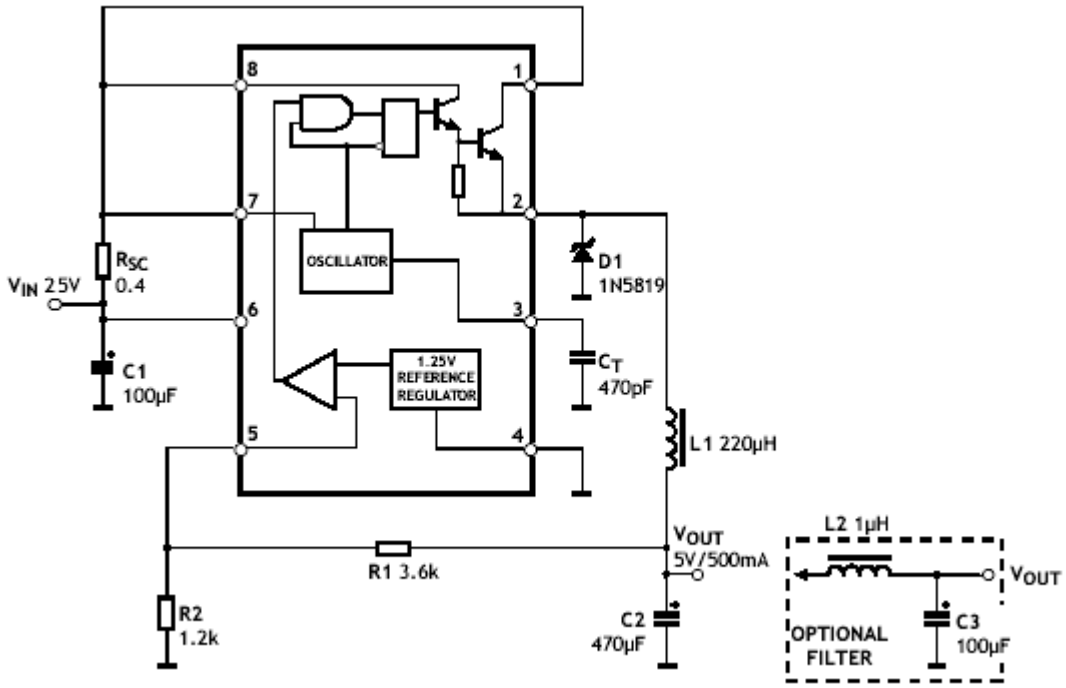
Typical Application Circuit

1. Step–up converter



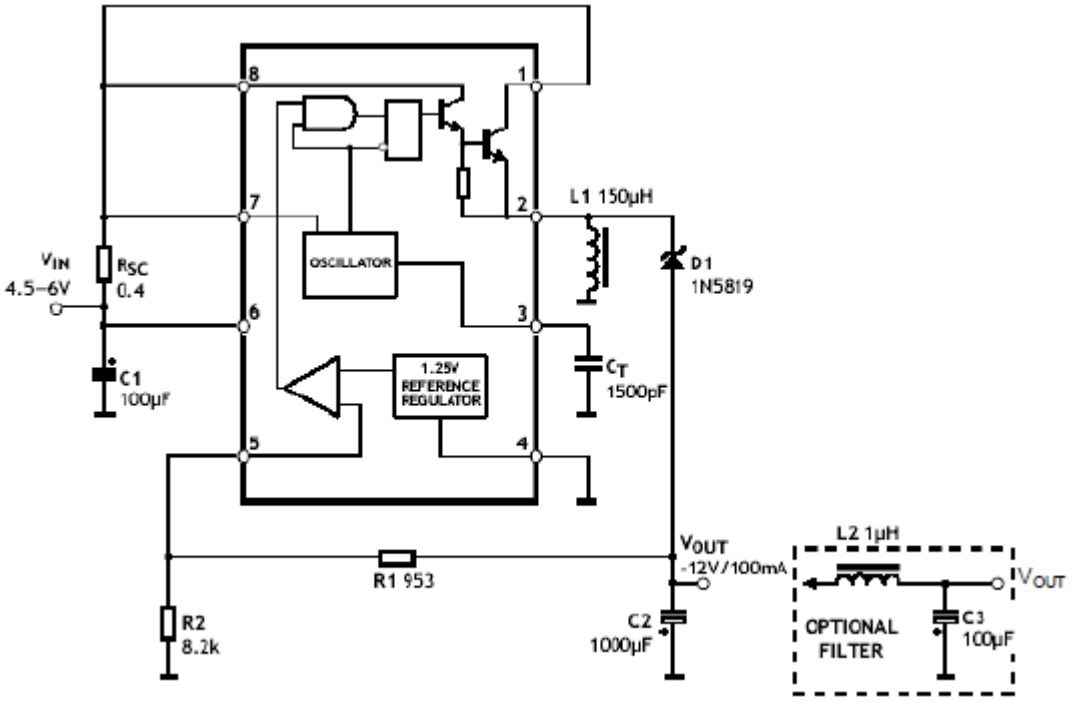
This is a typical step-up converter configuration.
In the steady state, if the resistor divider voltage at pin 5 is greater than the voltage in the non-inverting input, which is 1.25V deter-mined by the internal reference, the output of the comparator will go low. At the next switching period, the output switch will not conduct and the output voltage will eventually drop below its nominal voltage until the divider voltage at pin 5 is lower than 1.25V.
Then the output of the comparator will go high, the output switch will be allowed to conduct. Since Vpin5 = V_{OUT} * R2/(R1+R2) = 1.25(V), the output voltage can be decided by V_{OUT} = 1.25 * (R1+R2)/R2 (V).

2. Step-down converter



This is a typical step-down converter configuration. The working process in the steady state is similar to step-up converter, Vpin5 = V_{OUT} * R2/(R1+R2) = 1.25 (V), the output voltage can be decided by V_{OUT} = 1.25 * (R1+R2)/R2 (V).

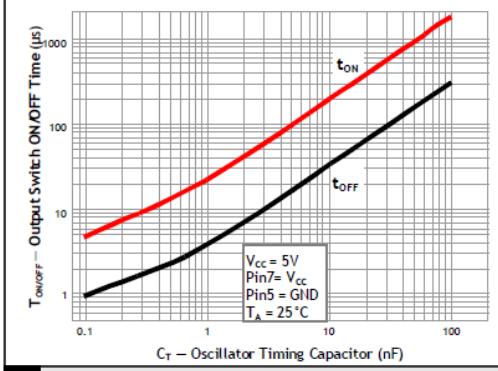
3. Voltage inverting converter



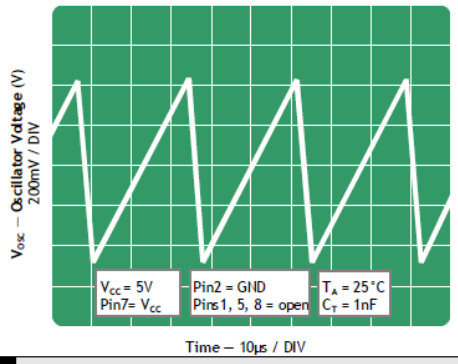
This is a typical inverting converter configuration. The working process in the steady state is similar to step-up converter, the difference in this situation is that the voltage at the non-inverting pin of the comparator is equal to 1.25V+V_{OUT}, then Vpin5=V_{OUT} * R2/(R1+R2) = 1.25V+V_{OUT}, so the output voltage can be decided by V_{OUT} = -1.25 * (R1+R2)/R1 (V).

Typical Performance Characteristics

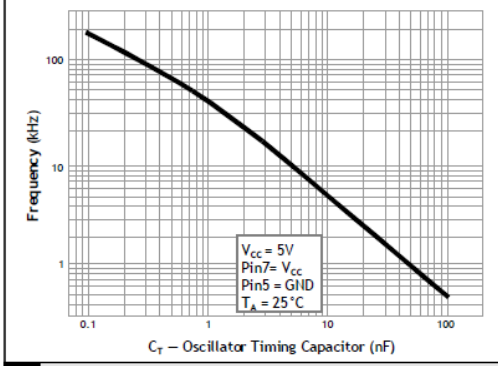
A OUTPUT SWITCH ON-OFF TIME versus OSCILLATOR TIMING CAPACITOR



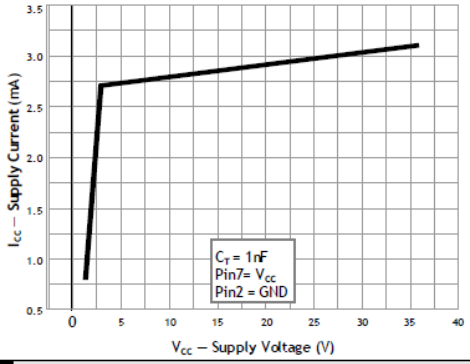
B TIMING CAPACITOR WAVEFORM



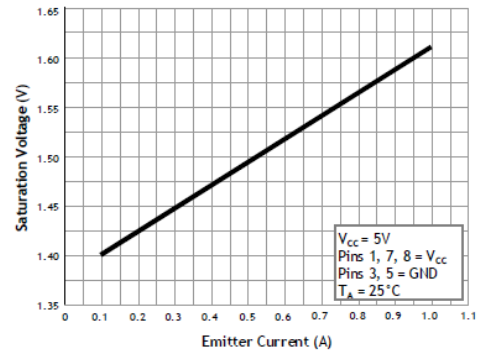
C OSCILLATOR FREQUENCY versus TIMING CAPACITOR



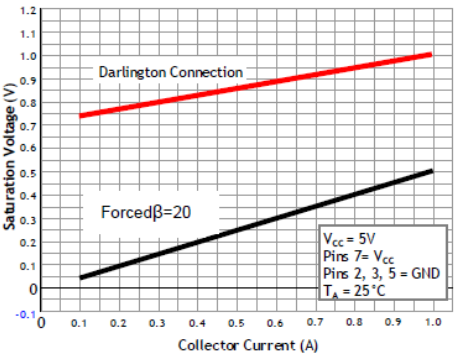
D STANDBY SUPPLY CURRENT versus SUPPLY VOLTAGE



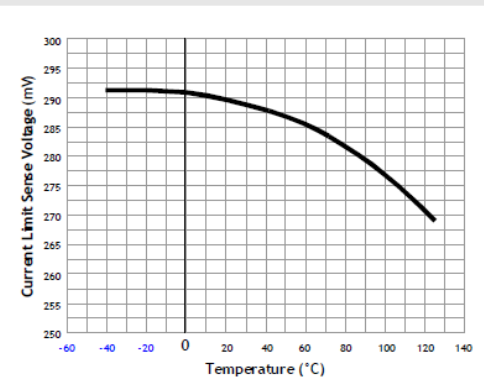
E EMITTER FOLLOWER CONFIGURATION OUTPUT SATURATION VOLTAGE vs. EMITTER CURRENT



F COMMON EMITTER CONFIGURATION OUTPUT SWITCH SATURATION VOLTAGE vs. COLLECTOR CURRENT

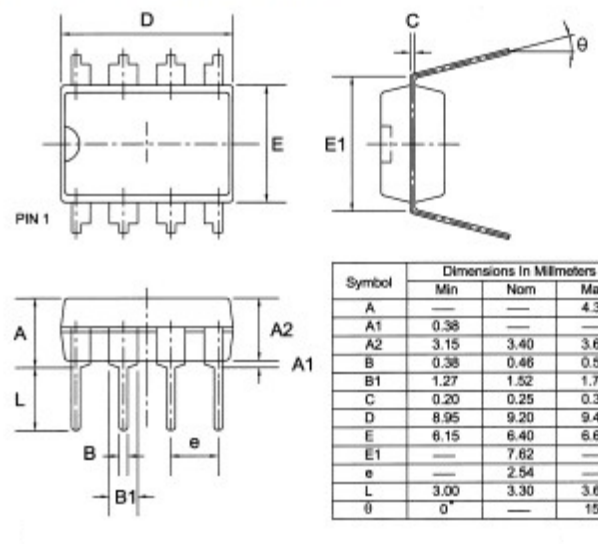


G CURRENT LIMIT SENSE VOLTAGE versus TEMPERATURE



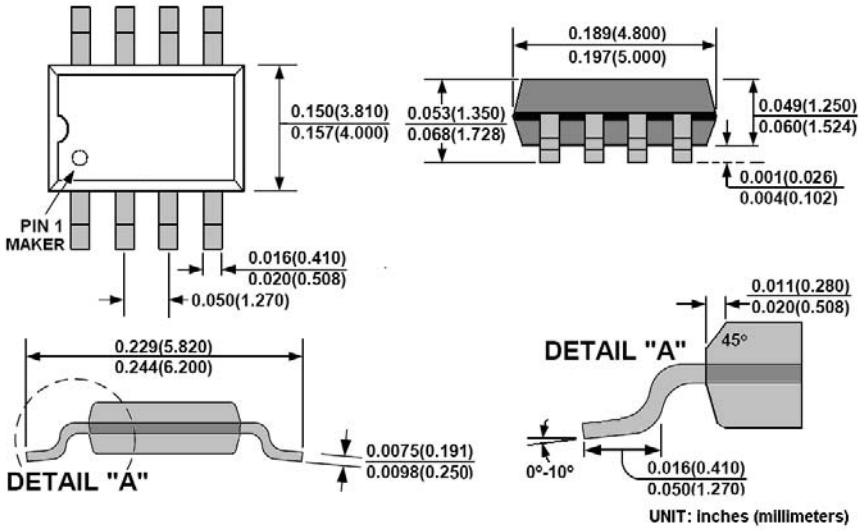
Package Outline

DIP8:



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	—	—	4.31	—	—	0.170
A1	0.38	—	—	0.015	—	—
A2	3.15	3.40	3.65	0.124	0.134	0.144
B	0.38	0.46	0.51	0.015	0.018	0.020
B1	1.27	1.52	1.77	0.050	0.060	0.070
C	0.20	0.25	0.30	0.008	0.010	0.012
D	8.95	9.20	9.45	0.352	0.362	0.372
E	6.15	6.40	6.65	0.242	0.252	0.262
E1	—	7.62	—	—	0.300	—
e	—	2.54	—	—	0.100	—
L	3.00	3.30	3.60	0.118	0.130	0.142
θ	0°	—	15°	0°	—	15°

SOP8:



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