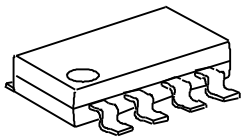
BOOST CONVERT CONTROL IC

GENERAL DESCRIPTION

The **GS3660B** is a boost topology switching regulator control IC for battery-used applications field. The **GS3660B** includes a totem-pole single output stage for driving NPN transistor or N-MOS, high precision reference (0.5V) for comparing output voltage with feedback amplifier, an internal dead-time control for controlling the minimum duty cycle, programmable soft start with short circuit protection function and logic level control for operating mode or standby mode.

FEATURES

- Wide supply voltage operating range: 1.8 to 15V
- Reference voltage precision: 2%
- Low current consumption: Operation Mode 5.5mA
  Standby-by Mode 1μA
- High speed oscillator frequency: 1MHz max.
- Programmable Soft Start function (SS)
- Short Circuit Protection function(SCP)
- Totem-pole output with adjustable on/off current (for NPN transistors or n-channel MOSFET)
- Logic level control stand-by mode function
- Package: TSSOP8

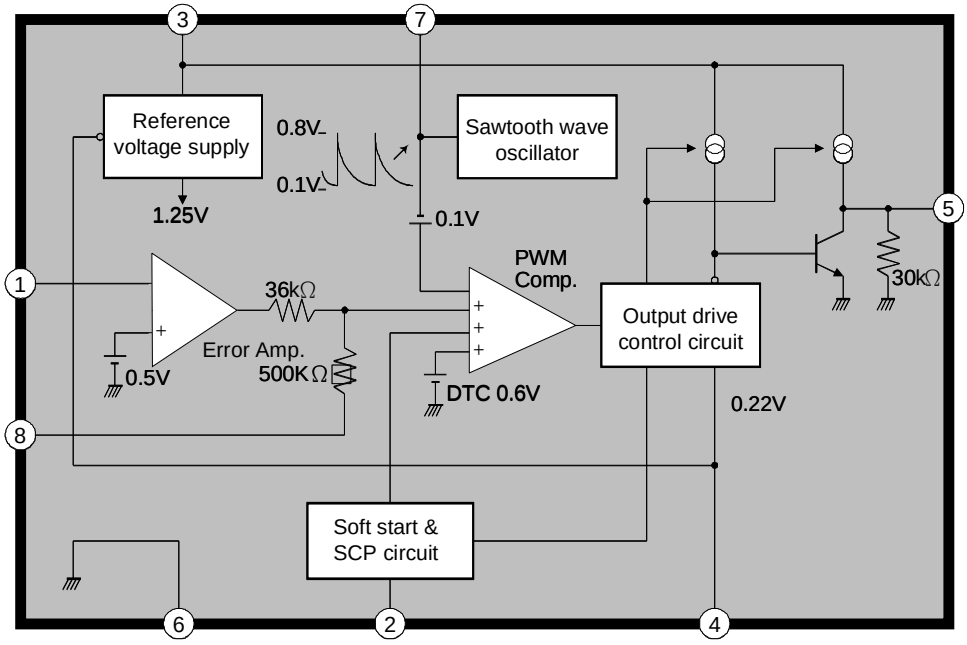


TSSOP8

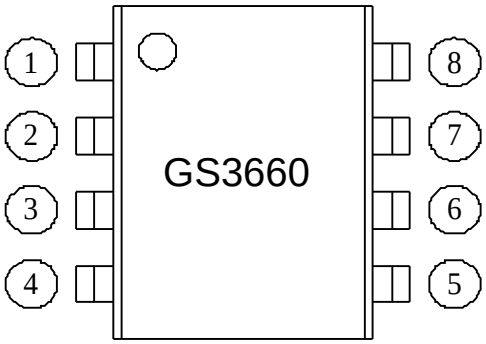
TYPICAL APPLICATION

- Digital Camera
- PDA
- Portable Equipment

FUNCTIONAL BLOCK DIAGRAM



MARK VIEW



PIN DESCRIPTION

Name	No.	I/O	Description
FB	1	I	Error amplifier inverting input pin
SCP	2	I	Connected a capacitor Soft start and SCP function pin
V_{CC}	3	P	IC power supply
EN/OFF	4	I	Output current setting and control pin
OUT	5	O	Totem-pole output
GND	6	P	IC ground
OSC	7	I	Capacitor and resistor connected for the frequency of oscillation
COMP	8	O	Error amplifier compensation output

DC ELECTRICAL CHARACTERISTICS(Ta=25℃,V_{CC}=+2V, unless otherwise noted)

Under Voltage Lock-Out section (U.V.L.O.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Low threshold voltage	V_{LOW}	--	-	-	0.9	V
Upper threshold voltage	V_{UPPER}	--	1.1	1.3	1.5	V

Soft Start section (S.S.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Input source current	I_{SS}	V_{SCP}= 0V	-1.5	-1.0	-0.7	μA
Soft start threshold voltage	V_{SST}	--	0.8	0.9	1.0	V

Short Circuit Protection section (S.C.P.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Input source current	I_{SCP}	V_{SCP}= 0V	-1.5	-1.0	-0.7	μA
S.C.P. threshold voltage	V_{SCP}	--	0.7	0.8	0.9	V

Oscillator section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Oscillation frequency	f	R_T=3.0KΩ,C_T=270pF	400	500	600	KHz
Frequency change with voltage	Δf / ΔV	V_{CC}=2V to 15V	-	2	10	%
Frequency change with temperature	Δf / ΔT	Ta = 0℃to 85℃	-	5	-	%

Idle Period Adjustment section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Maximum duty cycle	T_{DUTY}	R_T=3.0kΩ, C_T=270pF, V_{FB}=0.8V	75	-	85	%

Total device section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Stand-by current	$I_{STANDBY}$	Pin4 is open or V_{CC}	-	-	1	μA
Average supply current	I_{AVE}	R_B=390Ω,V_{CC}=0~20V	-	5.0	10	mA

DC ELECTRICAL CHARACTERISTICS (Cont.)

Error Amplifier section

PARAMETER		SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Input threshold voltage		V_{FB}	V_{COMP}=450mV	495	500	505	mV
V_T change with voltage		ΔV_{FB} / ΔV	V_{CC}=2V to 15V	-	5	20	mV
V_T change with temperature		ΔV_{FB} / ΔT	Ta = -10℃to 85℃	-	1	-	%
Input bias current		I_B	--	-1.0	-0.2	1.0	μA
Voltage Gain		Av	--	-	100	-	V/V
Frequency bandwidth		BW	Av=0 dB	-	6	-	MHz
Output voltage Swing	Positive	V_{POS}	--	0.78	0.87	-	V
	Negative	V_{NEG}	--	-	0.05	0.2	
Output source current		I_{SOURCE}	V_{COMP}=450mV	-	-40	-24	μA
Output sink current		I_{SINK}		24	40	-	μA

Output section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output high voltage	V_{OH1}	R_B=390Ω, I_O=-15mA	1.0	1.2	-	V
Output high voltage	V_{OH2}	R_B=750Ω, I_O=-10mA, V_{CC}= 1.8V	0.8	1.0	-	V
Output saturation voltage	V_{OL1}	R_B=390Ω, I_O=15mA	-	0.1	0.2	V
Output saturation voltage	V_{OL2}	R_B=750Ω, I_O=10mA, V_{CC}= 1.8V	-	0.1	0.2	V
Output source current	$I_{OSOURCE}$	R_B=390Ω, Vo=0.9V	-	-40	-20	mA
Output sink current	I_{OSINK}	R_B=390Ω, Vo=0.3V	30	40	-	mA
Internal pull-down resistor	R_O	--	20	30	40	kΩ

Output Current Setting / Control section

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Pin voltage	V_{BR}	R_B=390Ω	0.15	0.22	0.3	V
Output current setting resistance	R_B	-	300	390	5000	Ω
Input off condition	I_{OFF}	--	-20	-	0	μA
Input on condition	I_{ON}	--	-	-	-45	μA
Pin current range	I_{BR}	--	-1.8	-	-0.1	mA

TYPICAL CHARACTERISTICS

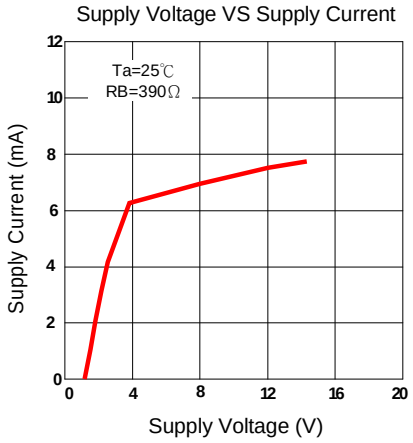


Figure 1

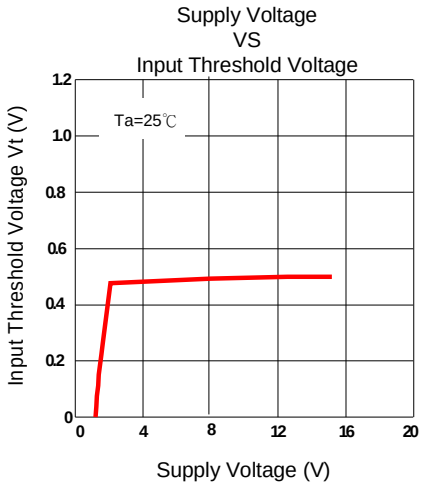


Figure 2

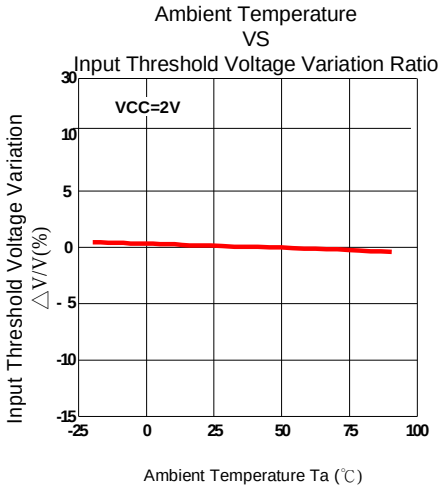


Figure 3

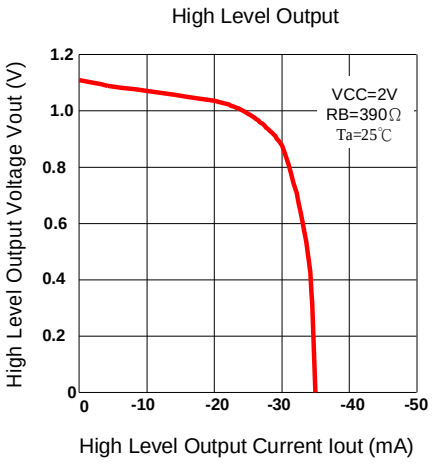


Figure 4

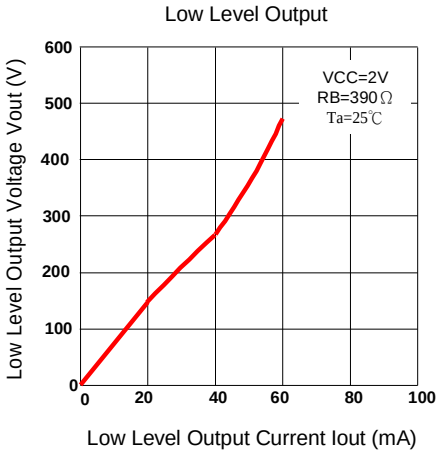


Figure 5

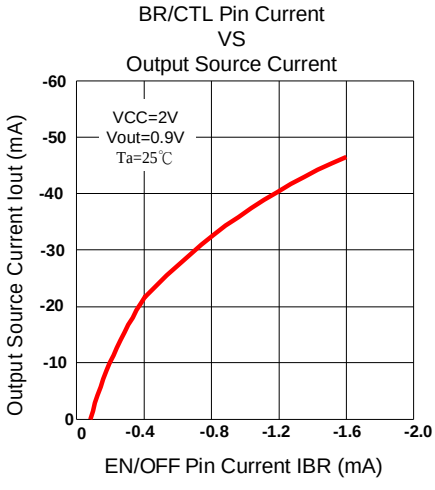


Figure 6

TYPICAL CHARACTERISTICS (Cont.)

BR/CTL Pin Current
VS
EN/OFF Pin Voltage

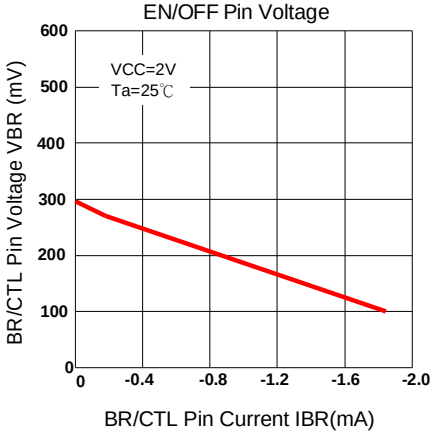


Figure 7

EN/OFF Pin Current
VS
Supply Current

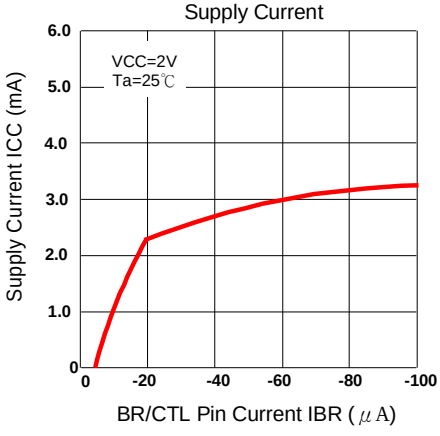


Figure 8

Triangle Oscillator Frequency
VS
Timing Resistance

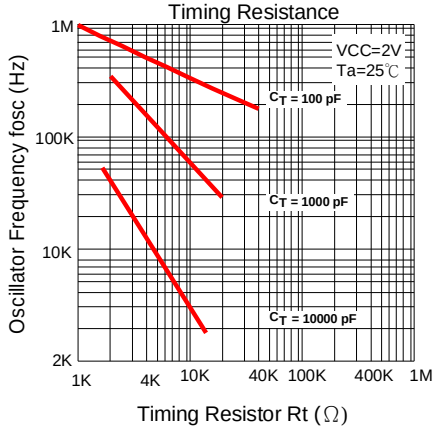


Figure 9

Supply Voltage
VS
Frequency Variation Ration

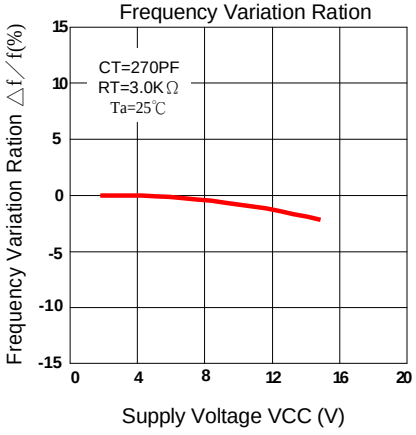


Figure 10

Ambient Temperature
VS
Frequency Variation Ration

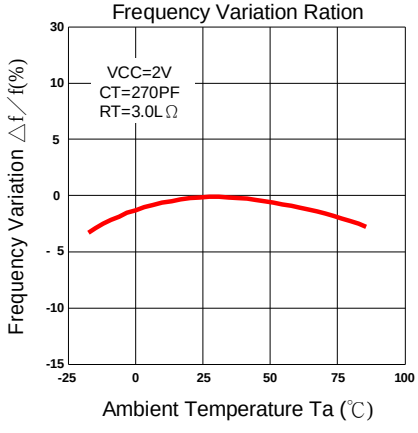


Figure 11

Output transistor

The **GS3660B** has a totem-pole transistor with a 40mA source/sink current rating to drive an external NPN transistor or NMOS directly. The driving current capability depends on a resistor R that is connected to EN/OFF pin (Pin4) of **GS3660B**. (see fig. 14)

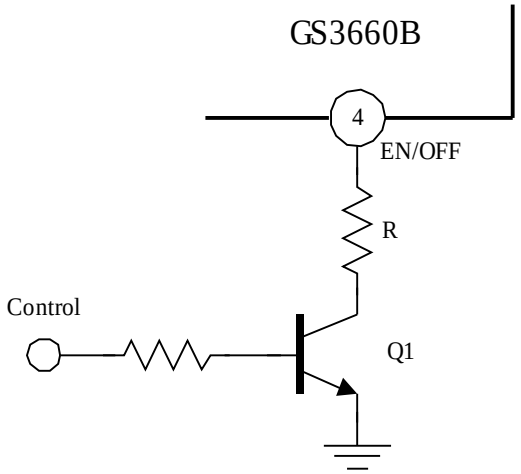


Figure 13. Output transistor driving control circuit

EN/OFF pin can also use to control the output of **GS3660B** for disable or enable function of system.

Control Pin	Q1	EN/OFF Pin	Output Transistor Function	Mode
Low	Off	Open	Disable	Stand-by
High	On	Bias Current	Enable	Operation

APPLICATION NOTE (1)

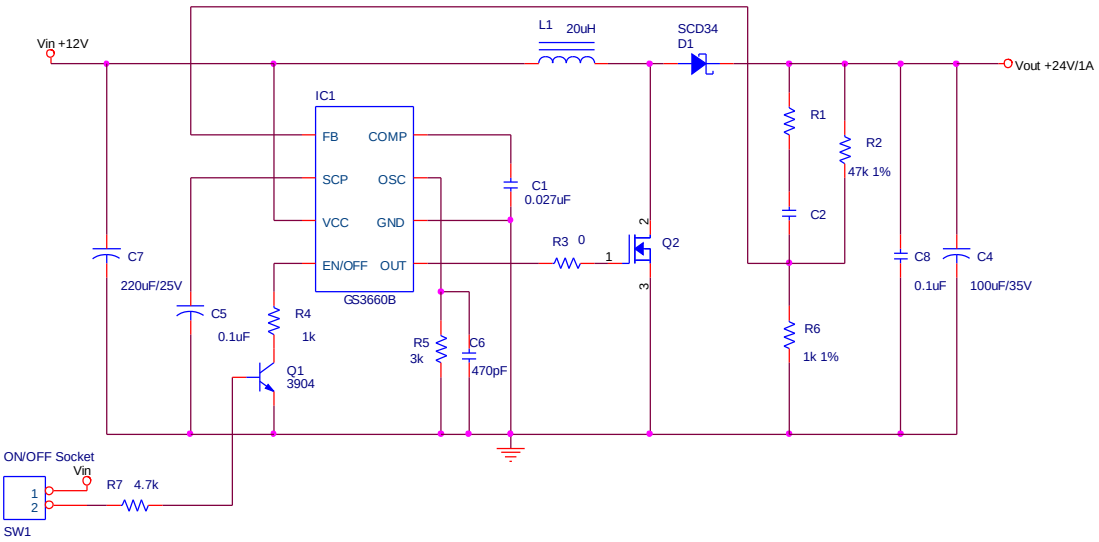


Figure 14. DC12V to DC24V Boost Regulator

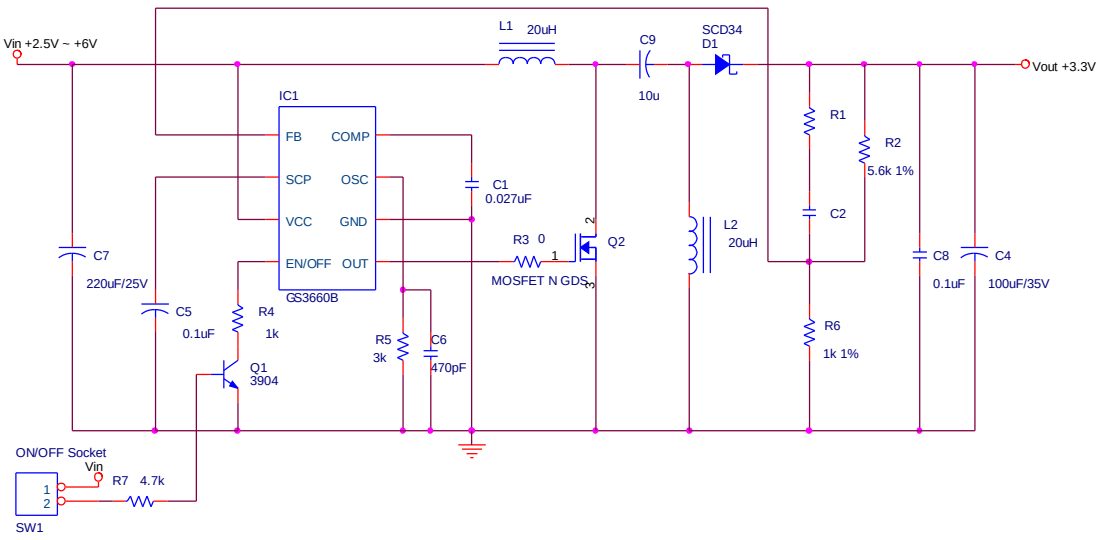
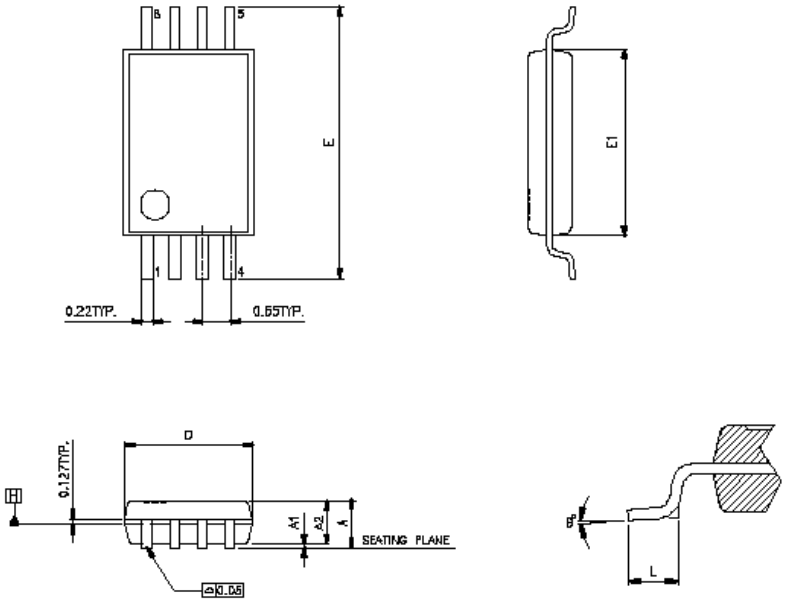


Figure 15. DC2.5V~DC6V to DC3.3V SEPIC Regulator

$$Vout = \left(1 + \frac{R1}{R2}\right) * 0.5$$

TSSOP8



SYMBOLS	MIN	NOR	MAX
A	-	-	1.20
A1	0.05	-	0.15
A2	0.96	1.01	1.06
D	2.90	3.00	3.10
E		6.40 BSC	
E1	4.30	4.40	4.50
L	0.45	0.60	0.75
θ°	0	-	8

UNIT:MM

NOTE:

1.JEDEC OUTLINE:MO-187 AA

2.DIMENSIONS “D” DOES NOT INCLUDE MOLD FLASH,PROTRUSIONS OR GATE BURRS.MOLD FLASH,PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE

3.DIMENSIONS “E1” DOES NOT INCLUDE INTERLEAD FLASH,OR PROTRUSIONS. INTERLEAD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.25 PER SIDE.

4.DIMENSIONS “0.22” DOES NOT INCLUDE DAMBAR PROTRUSIONS.ALLOWABLE DAMBAR PROTRUSIONS SHALL BE 0.08 MM TOTAL IN EXCESS OF THE ‘0.22’ DIMENSION AT MAXIMUM MATERIAL CONDITION.DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT.MINIMIM SPAC BETWEEN PROTRUSION AND ADJACENT LEAD IS 0.07MM.

5.DIMENSIONS “D” AND ‘E1’ TO BE DETERMINED AT DATUM PLANE H