

N-Channel Enhancement Mode Power MOSFET

Description

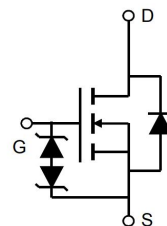
The GC380N60KE uses advanced super junction technology and design to provide excellent $R_{DS(on)}$, low gate charge and operation. This device is suitable for industry's AC-DC SMPS requirement for PFC, AC/DC power conversion, and industrial power application.

General Features

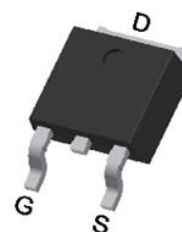
- V_{DS} 600V
- I_D (at $V_{GS} = 10V$) 9A
- $R_{DS(ON)}$ (at $V_{GS} = 10V$) < 380m Ω
- 100% Avalanche Tested
- RoHS Compliant
- ESD (HBM) : 7KV

Application

- Power switch
- DC/DC converters



Schematic diagram



TO-252

Ordering Information

Device	Package	Marking	Packaging
GC380N60KE	TO-252	GC380N60E	2500pcs/Reel

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	600	V
Continuous Drain Current	I_D	9	A
		5.7	
Pulsed Drain Current (note1)	I_{DM}	27	A
Gate-Source Voltage	V_{GS}	± 30	V
Power Dissipation	P_D	82	W
Single pulse avalanche energy (note2)	E_{AS}	22	mJ
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 To 150	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	R_{thJA}	133	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case	R_{thJC}	1.52	$^\circ\text{C/W}$

Specifications T _J = 25°C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 250μA	600	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 600V, V _{GS} = 0V	--	--	1	μA
Gate-Source Leakage	I _{GSS}	V _{GS} = ±30V	--	--	±10	μA
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250μA	3.0	3.5	4.0	V
Drain-Source On-Resistance	R _{DS(on)}	V _{GS} = 10V, I _D = 4.5A	--	315	380	mΩ
Forward Transconductance	g _{FS}	V _{DS} = 20V, I _D = 4.5A	--	6	--	S
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{GS} = 0V, V _{DS} = 300V, f = 1.0MHz	--	500	--	pF
Output Capacitance	C _{oss}		--	19	--	
Reverse Transfer Capacitance	C _{rss}		--	1.7	--	
Total Gate Charge	Q _g	V _{DD} = 300V, I _D = 4.5A, V _{GS} = 10V	--	17	--	nC
Gate-Source Charge	Q _{gs}		--	4	--	
Gate-Drain Charge	Q _{gd}		--	8	--	
Turn-on Delay Time	t _{d(on)}	V _{DD} = 300V, I _D = 4.5A, R _G = 10Ω	--	11	--	ns
Turn-on Rise Time	t _r		--	24	--	
Turn-off Delay Time	t _{d(off)}		--	51	--	
Turn-off Fall Time	t _f		--	25	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I _S	T _C = 25°C	--	--	9	A
Body Diode Voltage	V _{SD}	T _J = 25°C, I _{SD} = 4.5A, V _{GS} = 0V	--	--	1.2	V
Reverse Recovery Charge	Q _{rr}	I _F = 4.5A, V _{GS} = 0V di/dt=100A/us	--	1.7	--	μC
Reverse Recovery Time	T _{rr}		--	206	--	ns

Notes

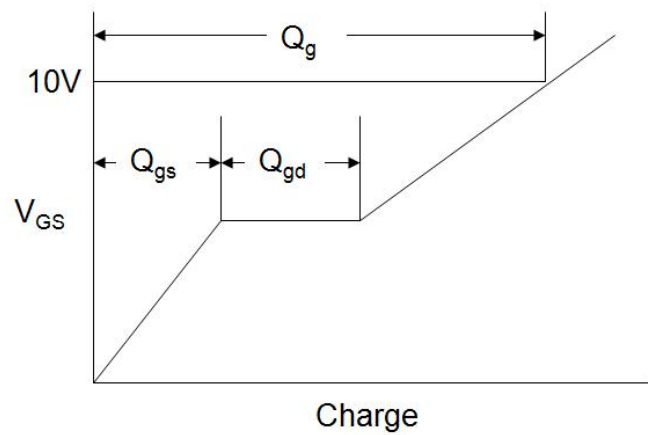
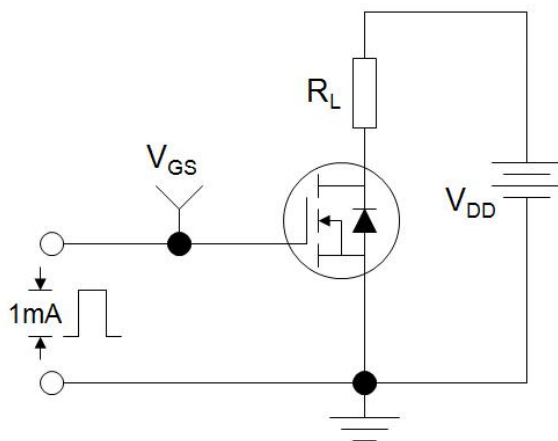
1. Repetitive Rating: Pulse width limited by maximum junction temperature

2. EAS condition : $T_J = 25^{\circ}\text{C}, V_{DD} = 50V, V_{GS} = 10V, L = 20mH, R_G = 25\Omega$

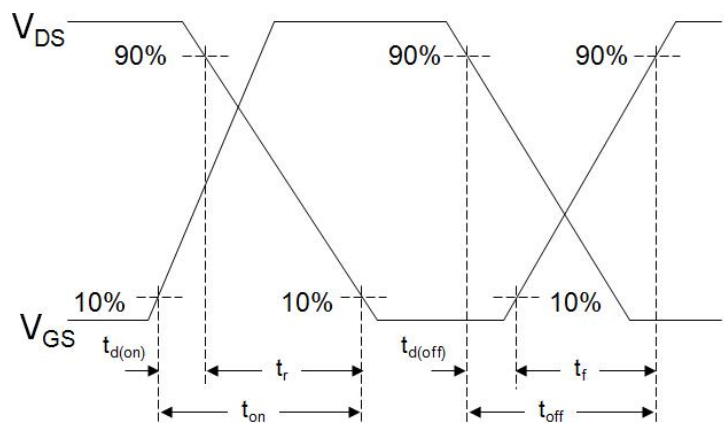
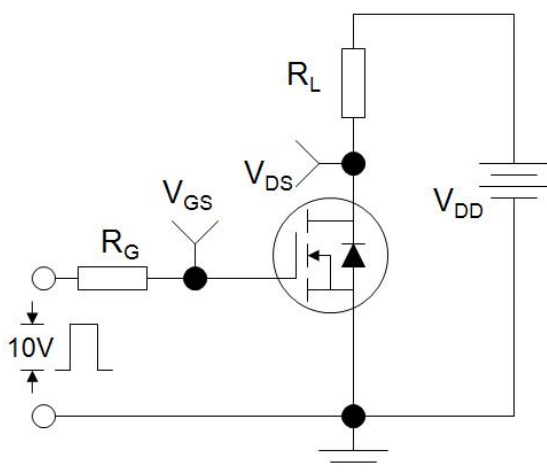
The table shows the minimum avalanche energy, which is 48mJ when the device is tested until failure

3. Identical low side and high side switch with identical R_G

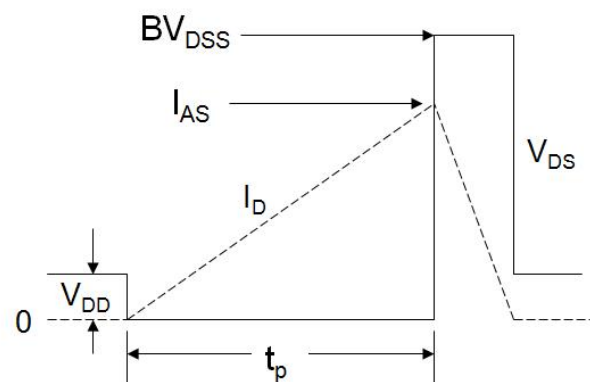
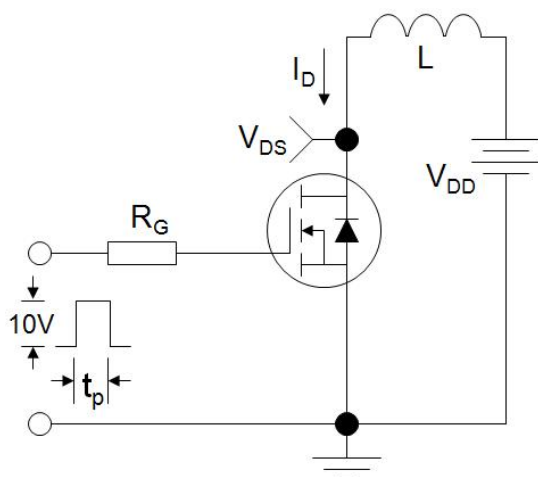
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 1. Output Characteristics

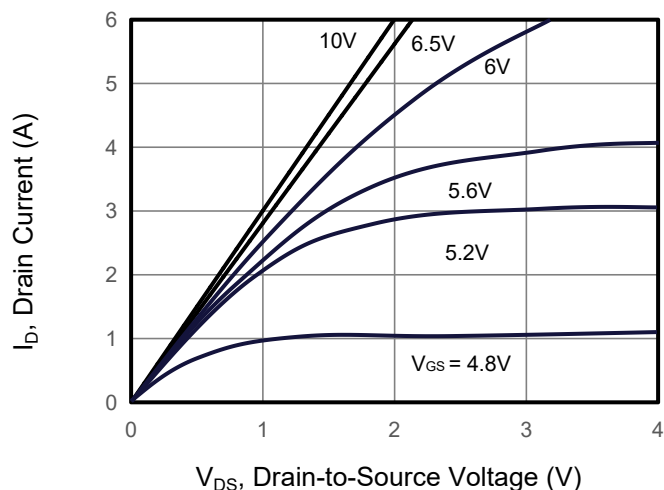


Figure 2. Transfer Characteristics

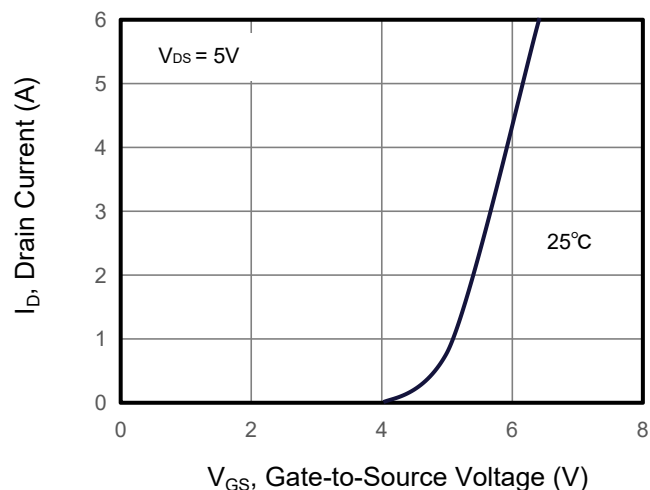


Figure 3. Drain Source On Resistance

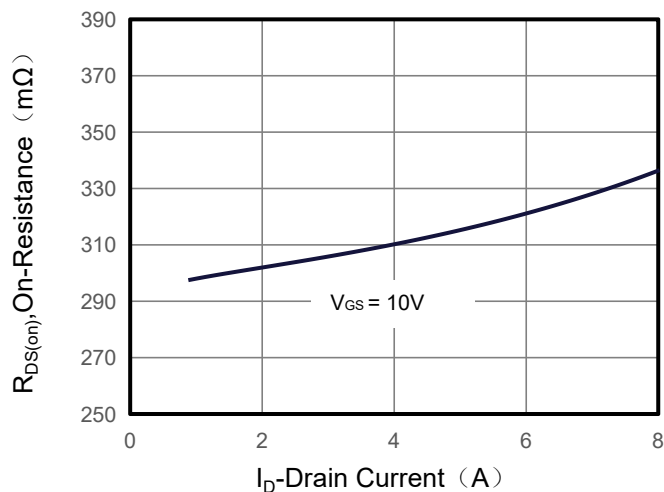


Figure 4. Gate Charge

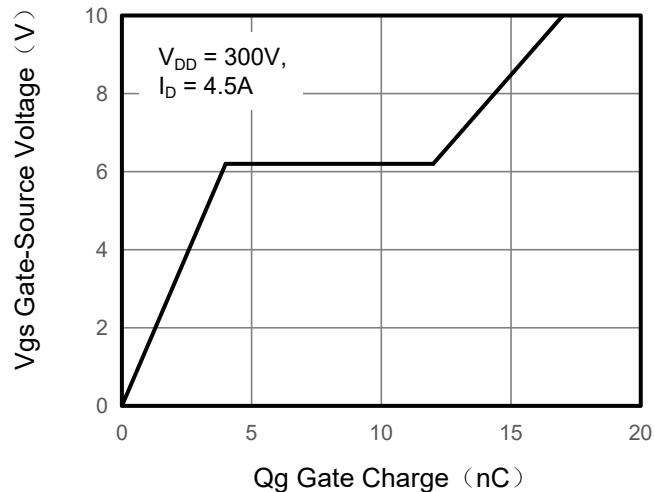


Figure 5. Capacitance

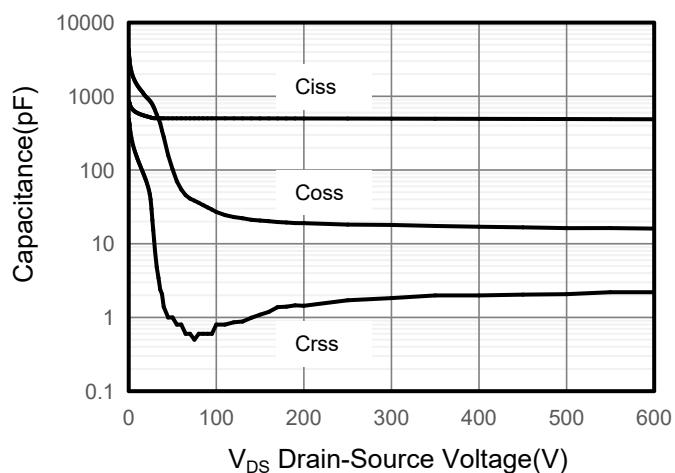
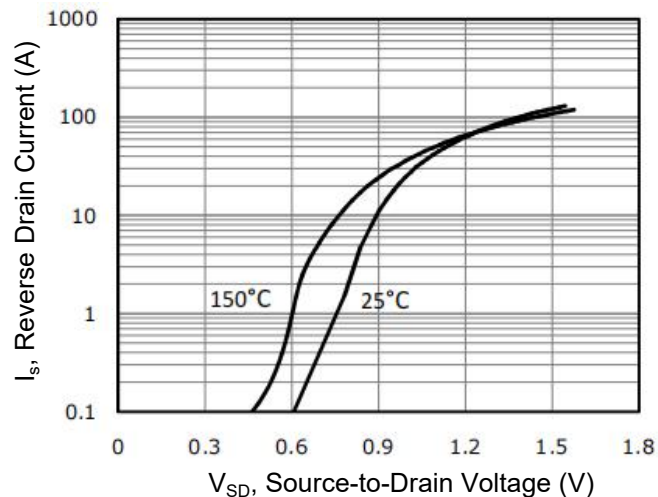


Figure 6. Source-Drain Diode Forward



Typical Characteristics $T_J = 25^\circ\text{C}$, unless otherwise noted

Figure 7. Drain-Source On-Resistance

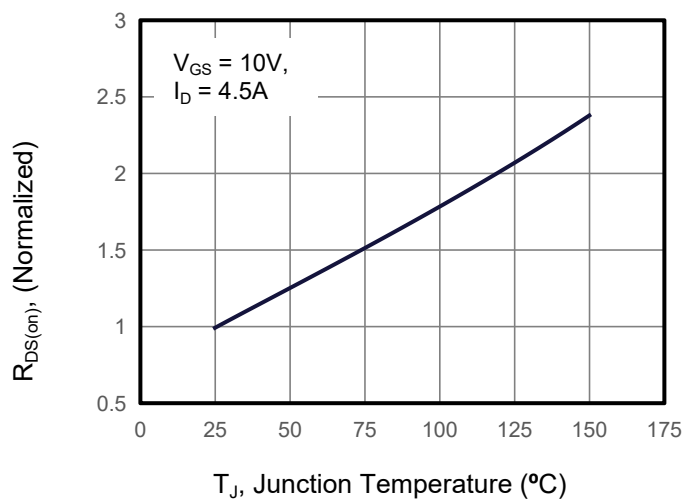


Figure 8. Safe Operation Area

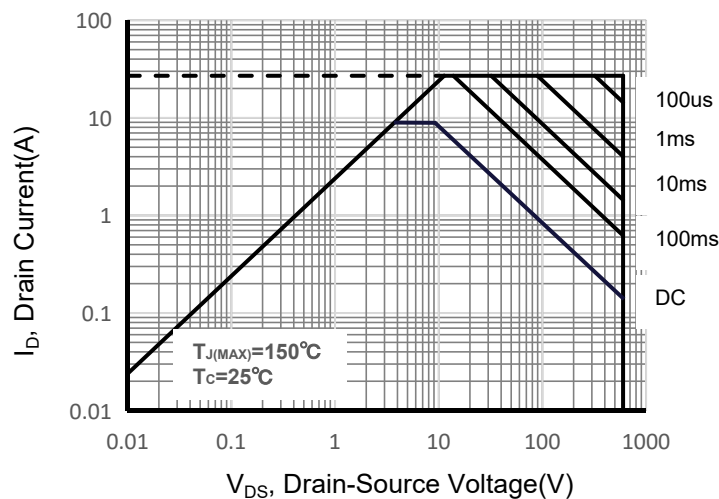


Figure 9. Maximum Continuous Drain Current vs Case Temperature

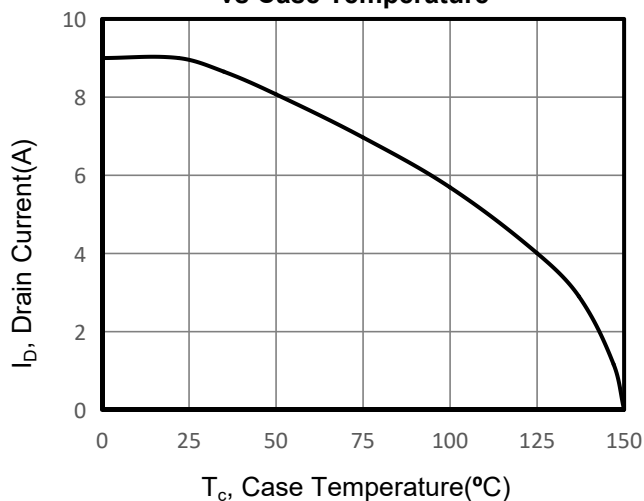
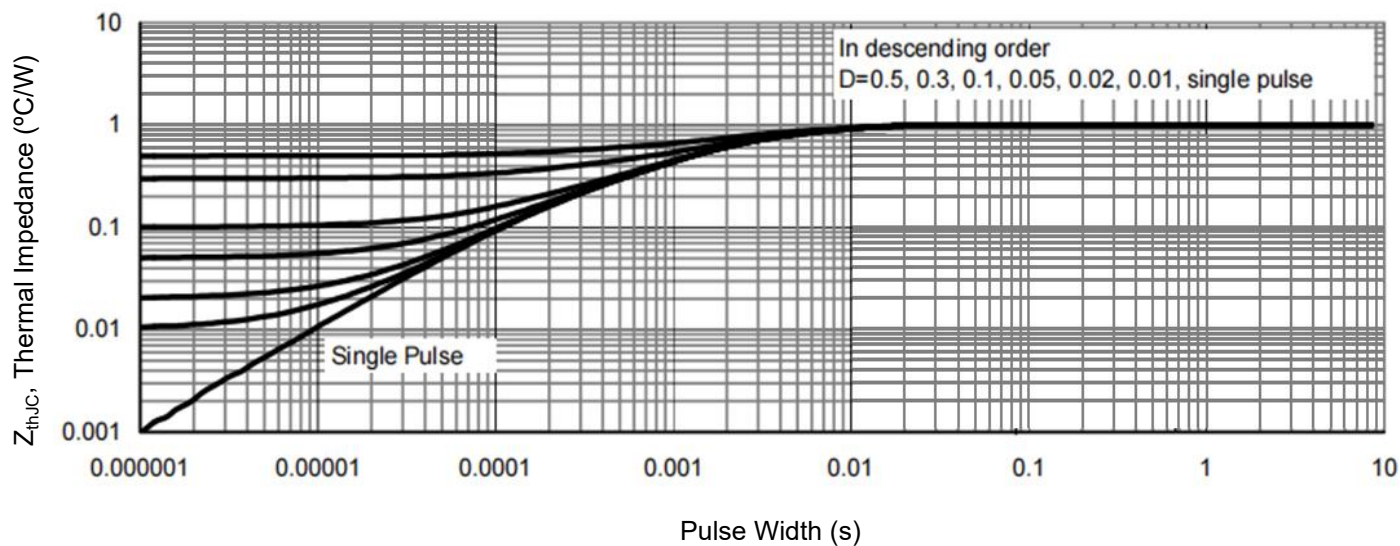
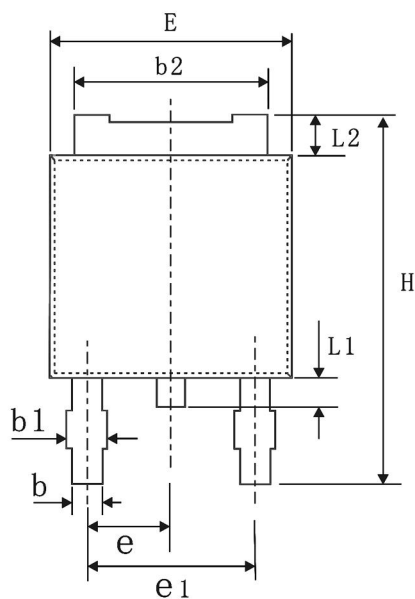


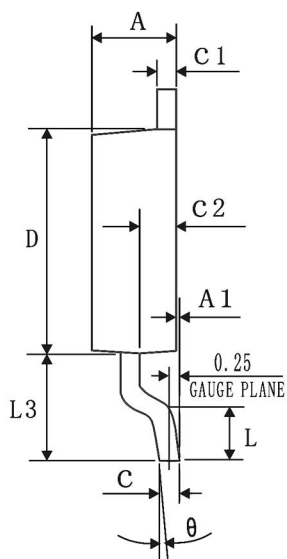
Figure 10. Normalized Maximum Transient Thermal Impedance



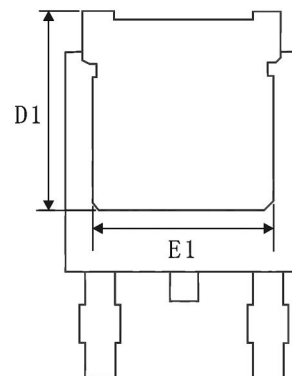
TO-252 Package Information



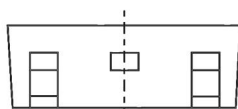
TOP VIEW



SIDE VIEW



BOTTOM VIEW



SIDE VIEW

COMMON DIMENSIONS
(UNITS OF MEASURE=mm)

SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.40
A1	0.00	0.05	0.10
b	0.762	0.812	0.862
b1	---	---	1.10
b2	5.23	5.33	5.43
c	0.458	0.508	0.558
C1	0.458	0.508	0.558
C2	0.80	1.00	1.20
D	6.00	6.10	6.20
D1	5.25	5.45	5.65
H	10.00	10.10	10.20
E	6.50	6.60	6.70
E1	4.75	4.85	4.95
e1	4.37	4.57	4.77
L	---	---	1.45
L1	0.60	0.75	0.90
L2	0.90	1.10	1.30
L3	2.80	3.00	3.20
θ	0°	4°	8°
e	2.285 BSC		