N-Channel Enhancement Mode Power MOSFET

Description

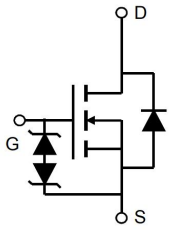
The GC380N60KE uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

General Features

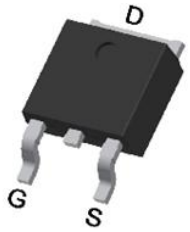
- V_{DS} 600V
- I_D (at V_{GS} = 10V) 9A
- $R_{DS(ON)}$ (at V_{GS} = 10V) < 380mΩ
- 100% Avalanche Tested
- RoHS Compliant
- ESD (HBM) : 7KV

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 = 25ºC, unless otherwise noted

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	600	V
Continuous Drain Current	T_C = 25ºC	I_D	9	A
	T_C = 100ºC		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	ºC

Thermal Resistance

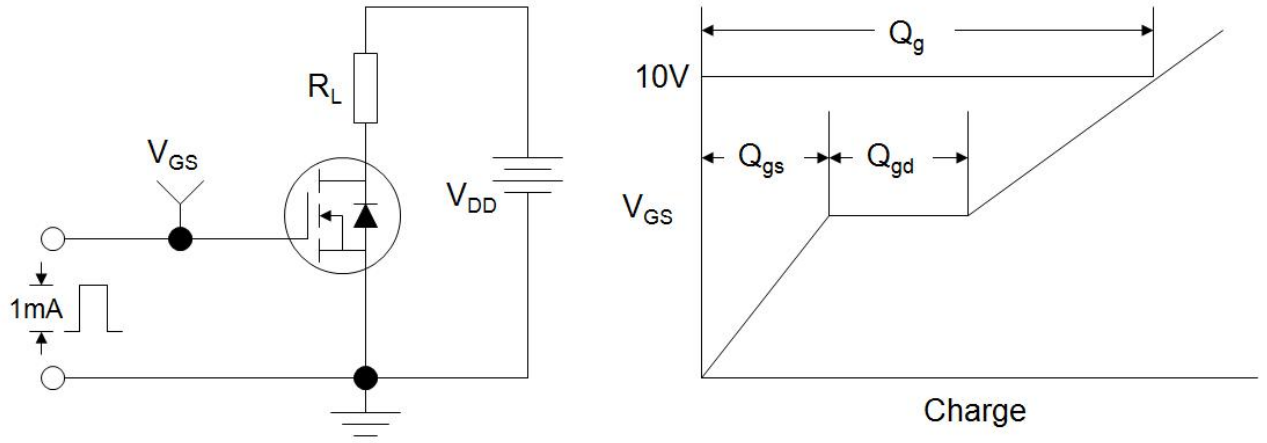
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	R_{thJA}	133	ºC/W
Thermal Resistance, Junction-to-Case	R_{thJC}	1.52	ºC/W

Specifications T_J = 25ºC, 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 = 25ºC	--	--	9	A
Body Diode Voltage	V_{SD}	T_J = 25ºC, I_{SD} = 4.5A, V_{GS} = 0V	--	--	1.2	V
Reverse Recovery Charge	Qrr	I_F = 4.5A, V_{GS} = 0V di/dt=100A/us	--	1.7	--	μC
Reverse Recovery Time	Trr		--	206	--	ns

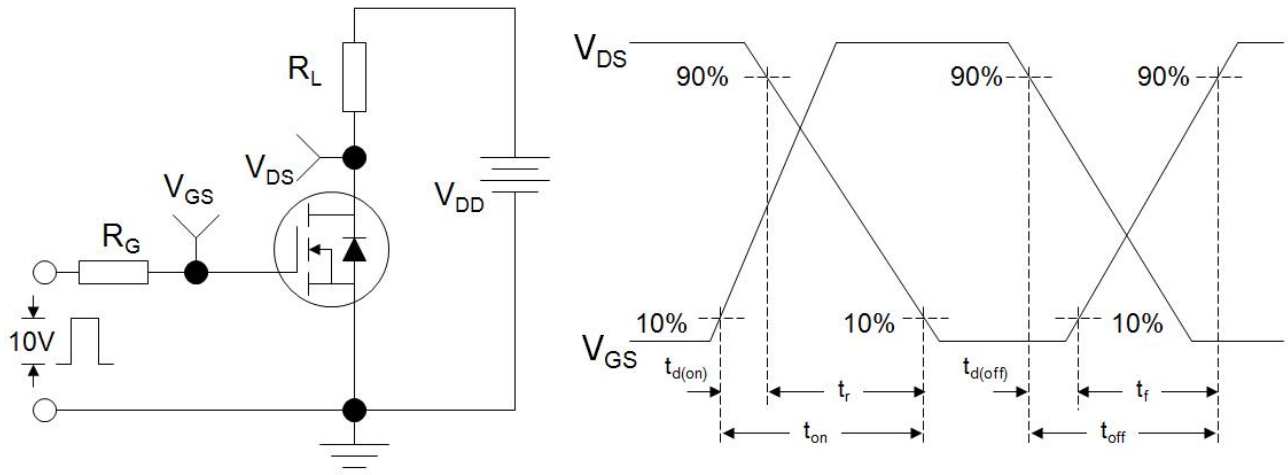
Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition : Tj=25℃ ,VDD=50V,VGS=10V,L=20mH,Rg=25Ω
   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

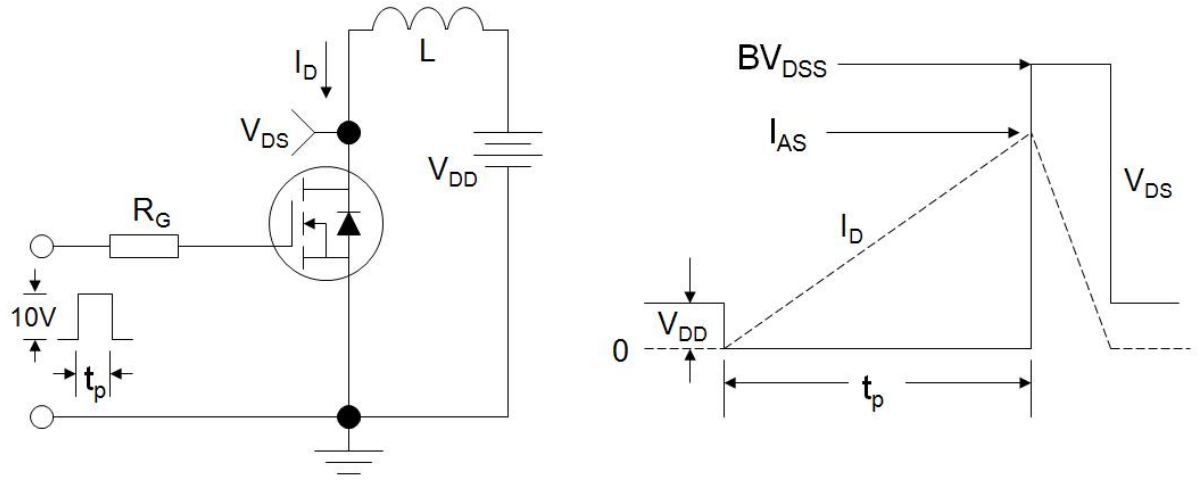
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics

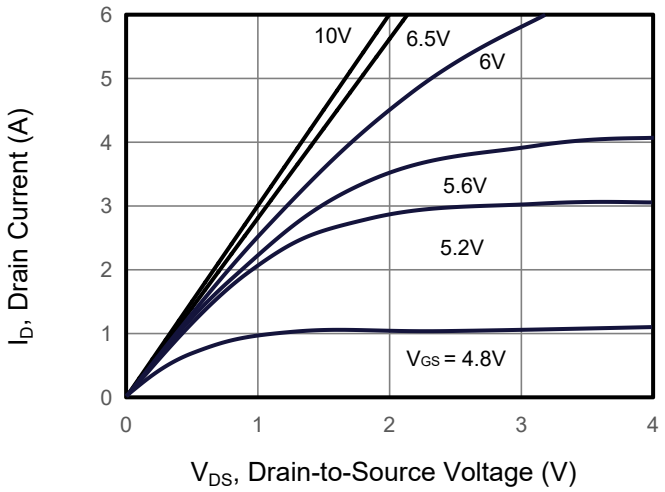


Figure 2. Transfer Characteristics

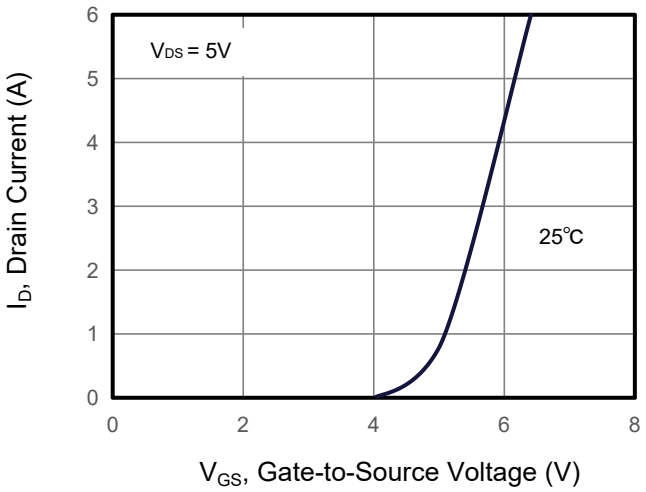


Figure 3. Drain Source On Resistance

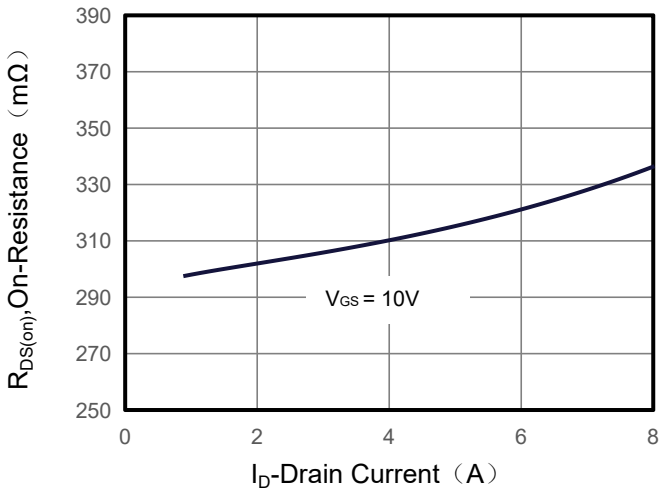


Figure 4. Gate Charge

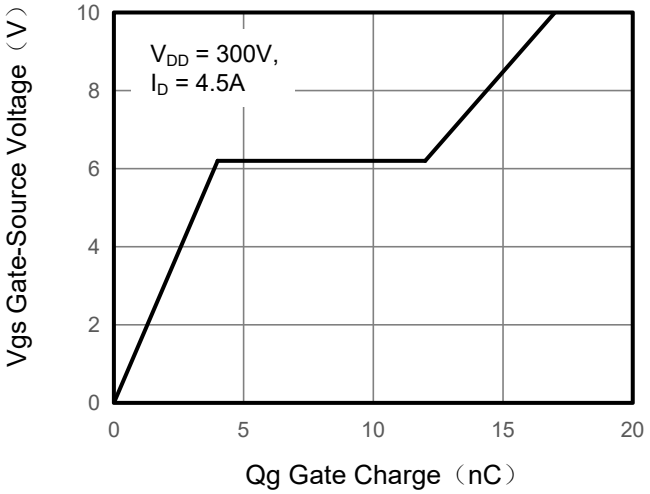


Figure 5. Capacitance

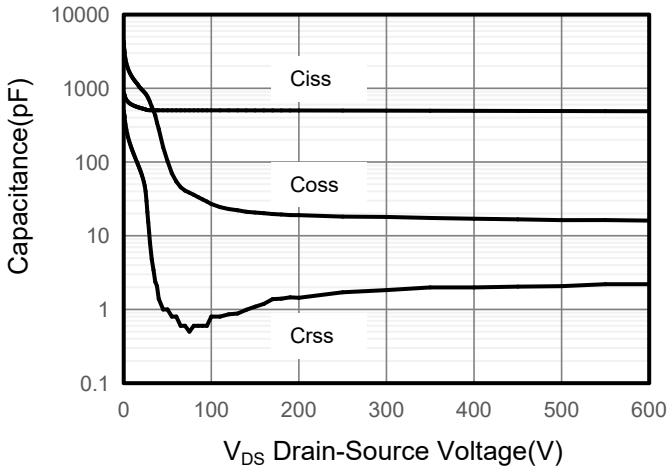
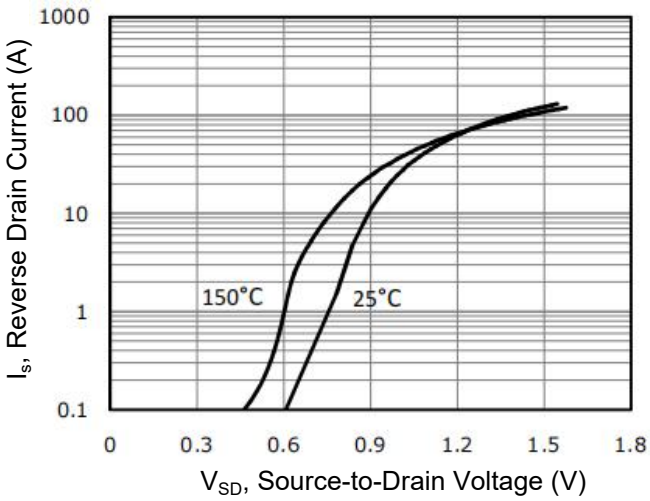


Figure 6. Source-Drain Diode Forward



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 7. Drain-Source On-Resistance

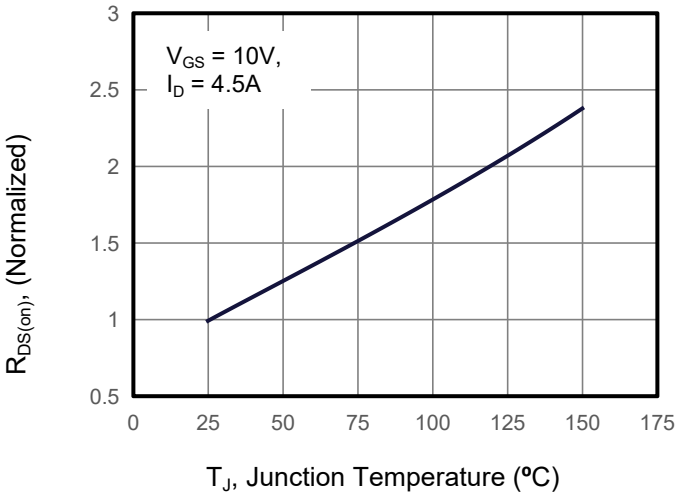


Figure 8. Safe Operation Area

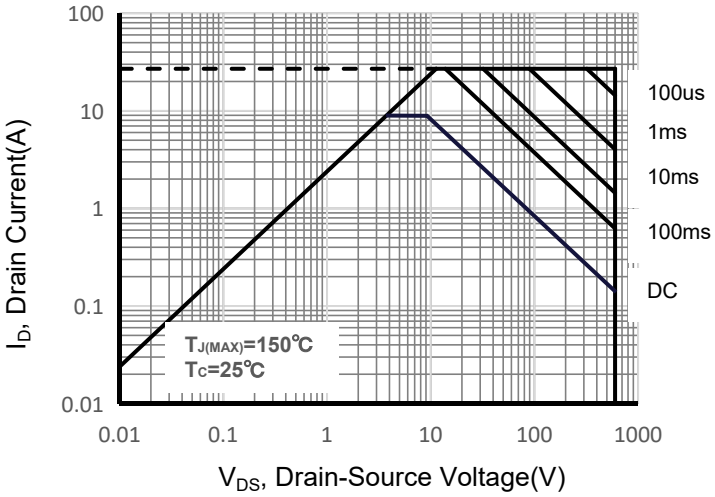


Figure 9. Maximum Continuous Drain Current vs Case Temperature

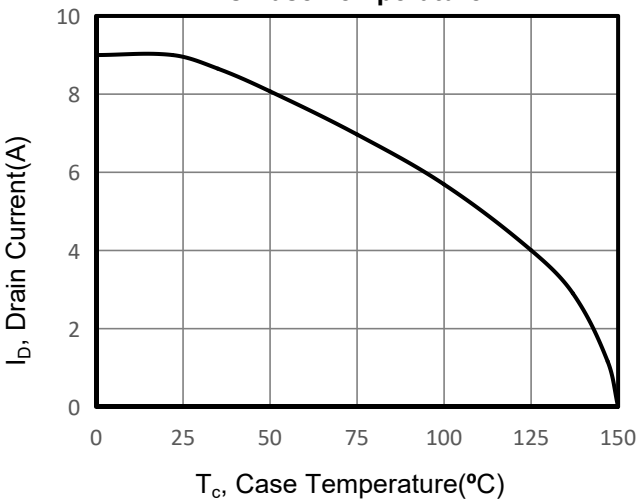
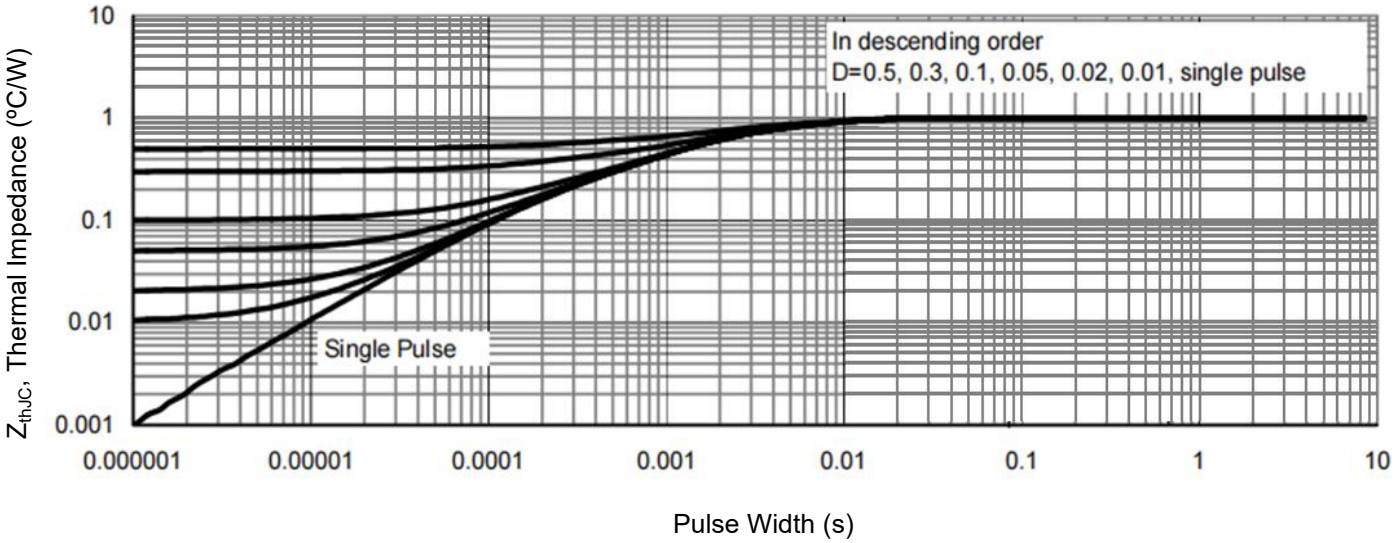
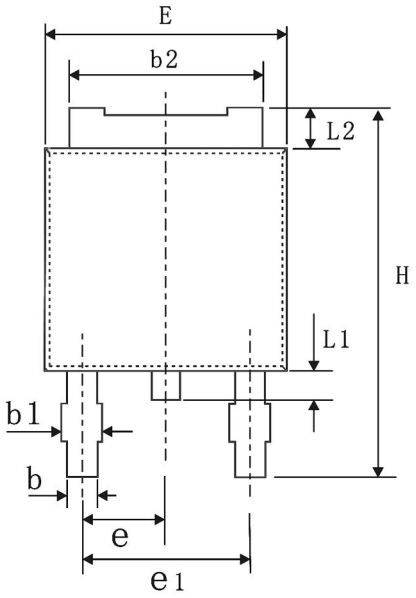


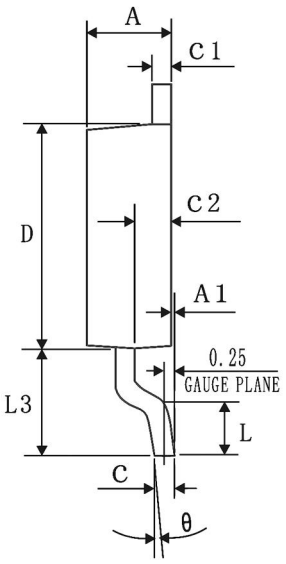
Figure 10. Normalized Maximum Transient Thermal Impedance



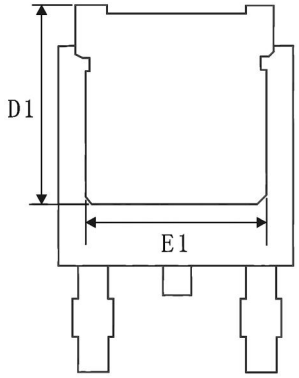
TO-252 Package Information



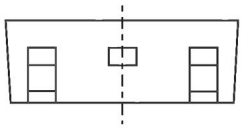
TOP VIEW



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		