

Description

The G13N04 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

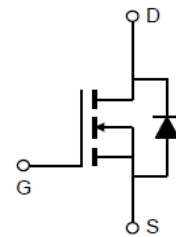
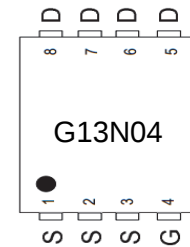
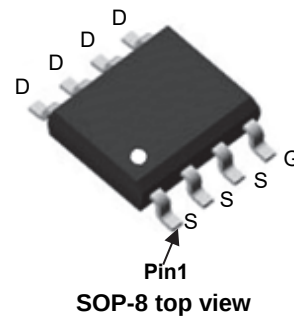
General Features

V_{DSS}	$R_{DS(ON)}$ @ 4.5V (typ)	$R_{DS(ON)}$ @ 10V (typ)	I_D
40V	13m Ω	10m Ω	13A

- High density cell design for ultra low $R_{DS(on)}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- RoHS Compliant

Application

- Load switching
- Hard switched and high frequency circuits
- Quick charge application

**Schematic diagram****Marking and pin Assignment****SOP-8 top view****Ordering Information**

Part Number	Marking	Case	Packaging
G13N04	G13N04	SOP-8	4000pcs/Reel

Absolute Maximum Ratings ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	13	A
Drain Current-Continuous($T_C=100^{\circ}\text{C}$)	$I_D(100^{\circ}\text{C})$	8.2	A
Pulsed Drain Current	I_{DM}	52	A
Maximum Power Dissipation	P_D	3	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^{\circ}\text{C}$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient ^(Note 2)	$R_{\theta JA}$	41.67	$^{\circ}\text{C/W}$
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Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

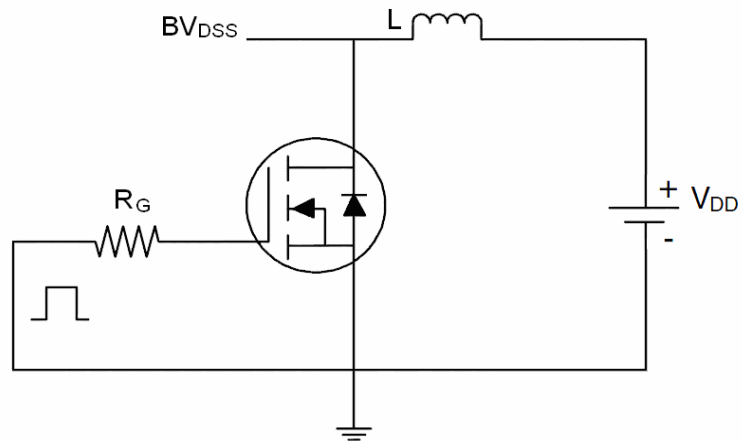
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	40	46	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =40V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.2	1.6	2.3	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =6.5A	-	10	12	mΩ
		V _{GS} =4.5V, I _D =6.5A	-	13	16	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =6.5A	-	75	-	S
Dynamic Characteristics ^(Note4)						
Input Capacitance	C _{iss}	V _{DS} =20V, V _{GS} =0V, F=1.0MHz	-	1780	-	PF
Output Capacitance	C _{oss}		-	209	-	PF
Reverse Transfer Capacitance	C _{rss}		-	160	-	PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =20V, R _L =2Ω V _{GS} =10V, R _G =3Ω	-	6.4	-	nS
Turn-on Rise Time	t _r		-	17.2	-	nS
Turn-Off Delay Time	t _{d(off)}		-	29.6	-	nS
Turn-Off Fall Time	t _f		-	16.8	-	nS
Total Gate Charge	Q _g	V _{DS} =20V, I _D =6.5A, V _{GS} =10V	-	30	-	nC
Gate-Source Charge	Q _{gs}		-	4.2	-	nC
Gate-Drain Charge	Q _{gd}		-	9.5	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V _{SD}	V _{GS} =0V, I _S =13A	-	-	1.0	V
Diode Forward Current ^(Note 2)	I _S		-	-	13	A
Reverse Recovery Time	t _{rr}	TJ = 25°C, IF = 6.5A	-	29	-	nS
Reverse Recovery Charge	Q _{rr}	di/dt = 100A/μs ^(Note3)	-	26	-	nC

Notes:

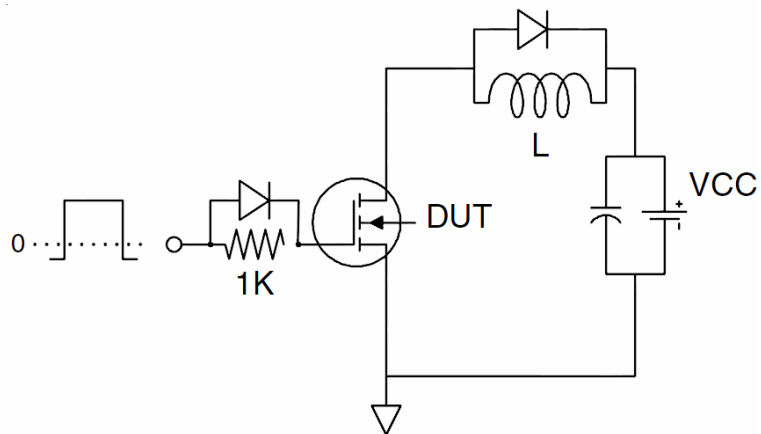
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Test circuit

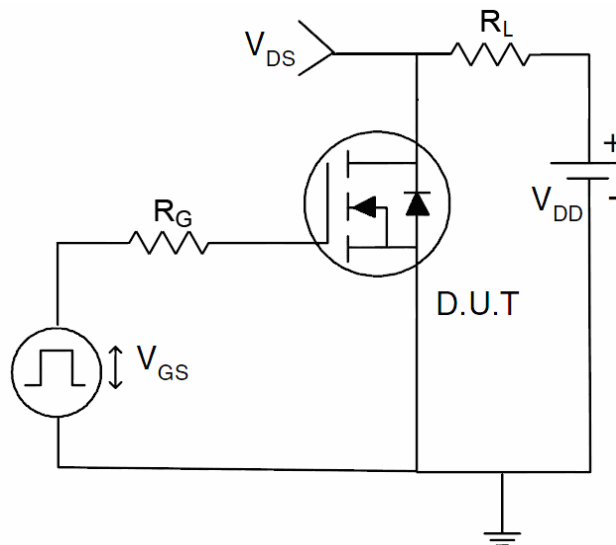
1) E_{AS} Test Circuit



2) Gate Charge Test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

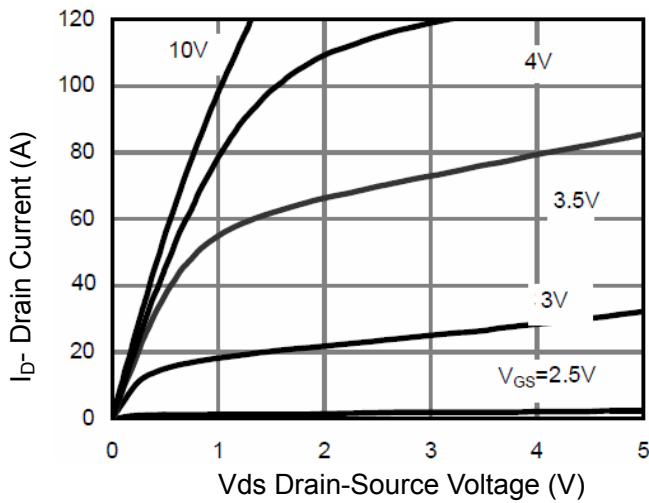


Figure 1 Output Characteristics

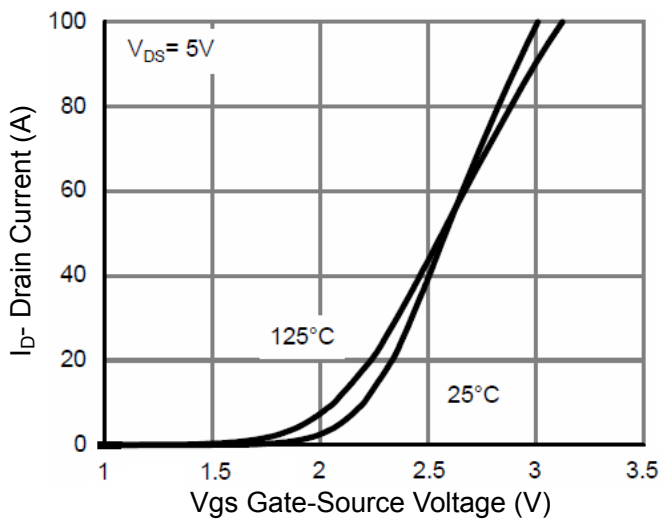


Figure 2 Transfer Characteristics

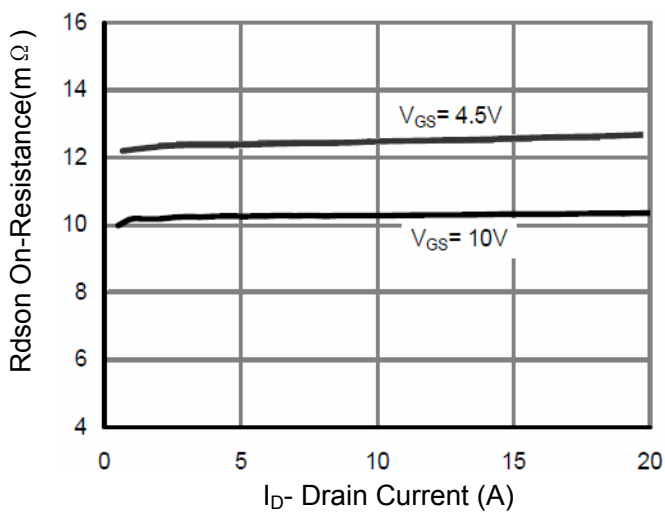


Figure 3 Rdson- Drain Current

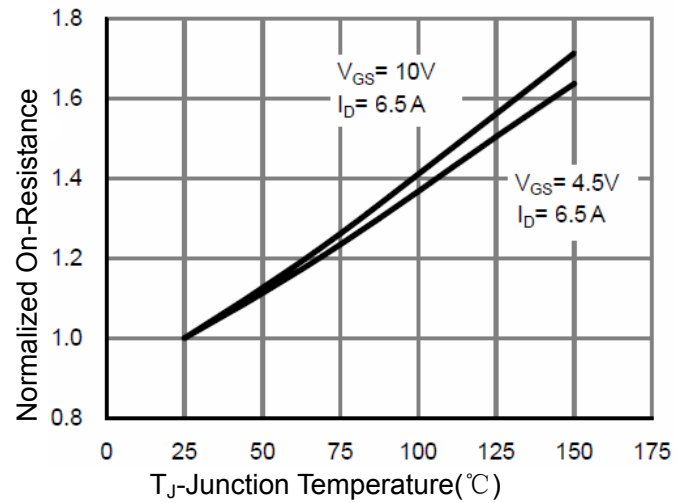


Figure 4 Rdson-Junction Temperature

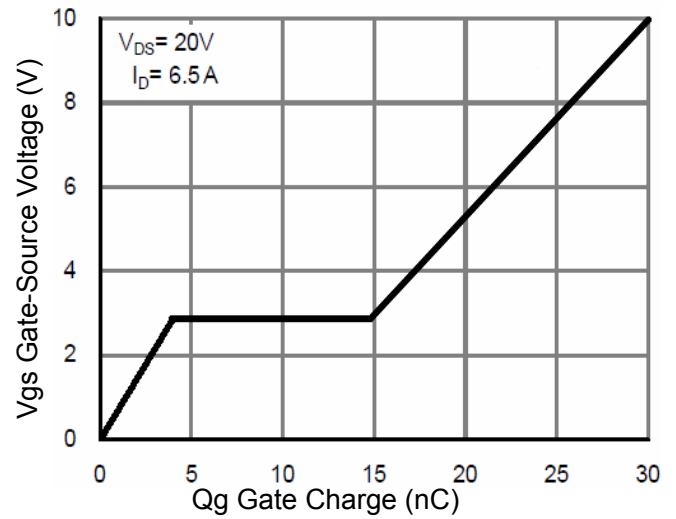


Figure 5 Gate Charge

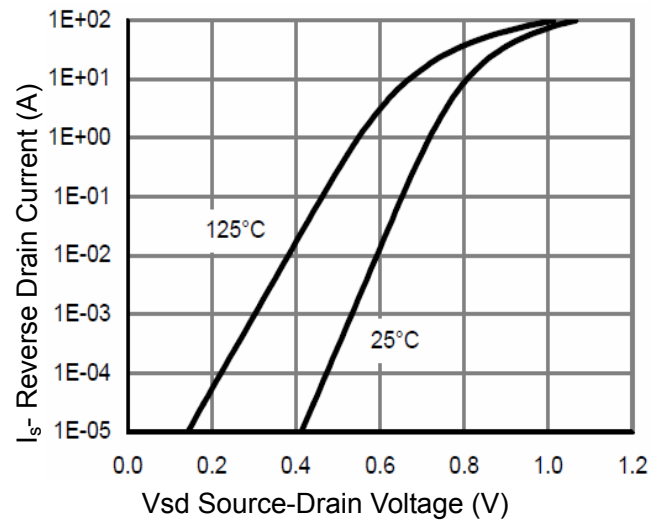


Figure 6 Source- Drain Diode Forward

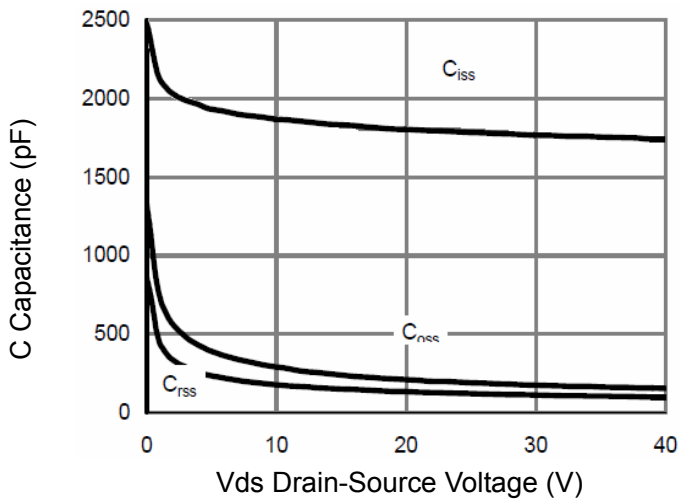


Figure 7 Capacitance vs Vds

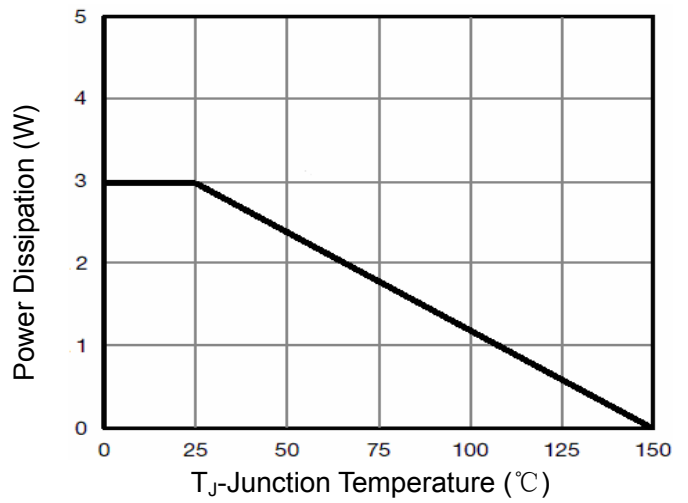


Figure 9 Power De-rating

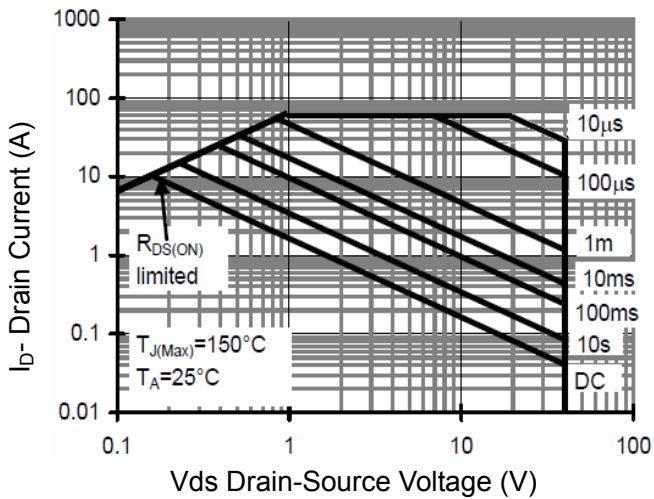


Figure 8 Safe Operation Area

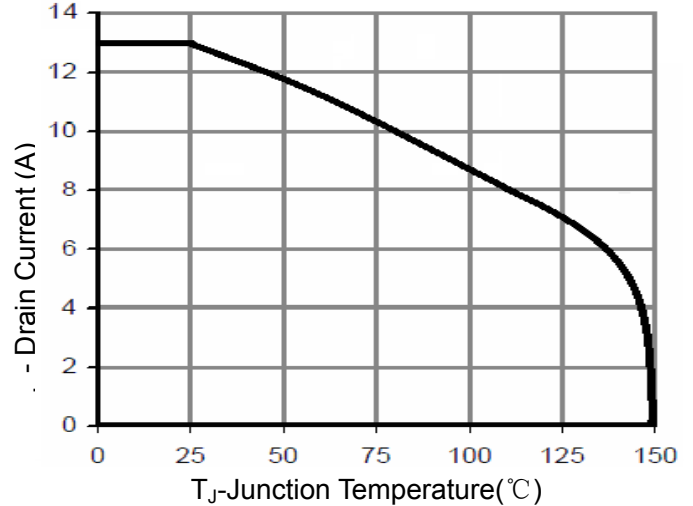


Figure 10 Current De-rating

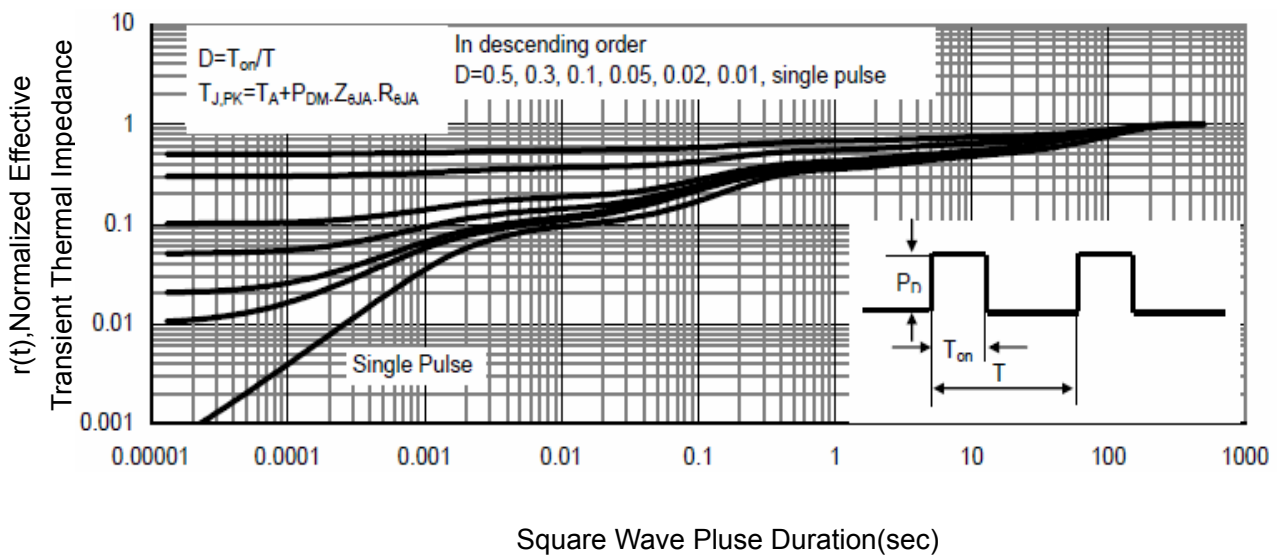
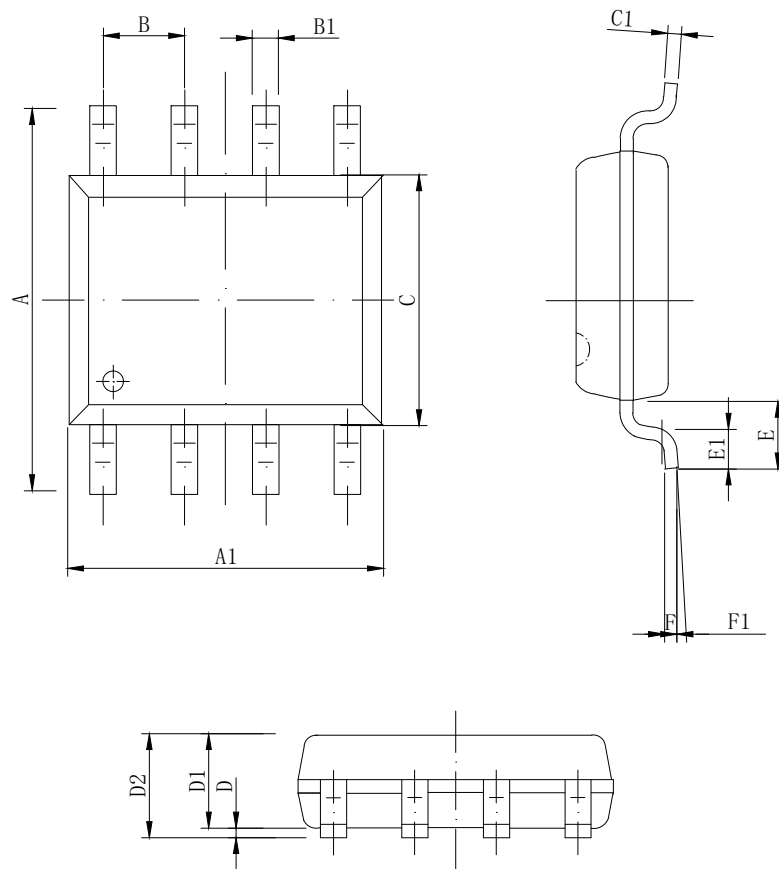


Figure 11 Normalized Maximum Transient Thermal Impedance

SOP-8 Package information



DIM	MIN	NOM	MAX
A	5.800	6.000	6.200
A1	4.800	4.900	5.000
B	1.270BSC		
B1	0.35 ^ 8x	0.40 ^ 8x	0.45 ^ 8x
C	3.780	3.880	3.980
C1	—	0.203	0.253
D	0.050	0.150	0.250
D1	1.350	1.450	1.550
D2	1.500	1.600	1.700
E	1.060 REF		
E1	0.400	0.700	0.100
F	0.250BSC		
F1	2°	4°	6°

All Dimensions in mm