



## 40V/180A N-Channel Advanced Power MOSFET

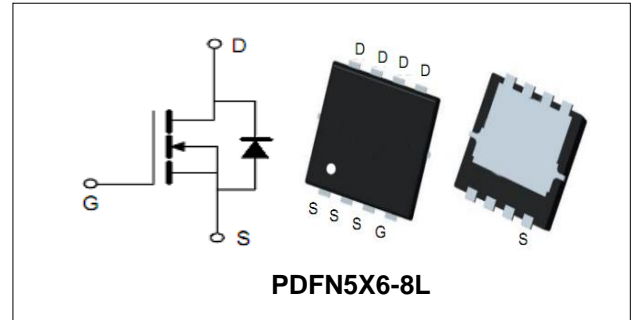
### Features

- Fast switching capability
- Robust design with better EAS performance
- EMI Improved

### Applications

- Server/Telecom
- High Power Supply
- E-Tools
- Motor Driver
- BMS

BVDSS	40	V
ID	180	A
RDSON@VGS=10V	1.3	mΩ
RDSON@VGS=4.5V	2.2	mΩ



### Order Information

Product	Package	Marking	Reel Size	Reel	Carton
PGN04N013	PDFN5X6-8L	PGN04N013	13inch	5000PCS	50000PCS

### Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit	
<b>Common Ratings (TC=25°C Unless Otherwise Noted)</b>				
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	40	V	
$V_{GS}$	Gate-Source Voltage	±20	V	
$T_J$	Maximum Junction Temperature	150	°C	
$T_{STG}$	Storage Temperature Range	-55 to 150	°C	
$I_S$	Diode Continuous Forward Current	TC =25°C	140	A
<b>Mounted on Large Heat Sink</b>				
$E_{AS}$	Single Pulse Avalanche Energy (Note1)	182	mJ	
$I_{DM}$	Pulse Drain Current Tested (Silicon Limit) (Note2)	TC =25°C	540	A
$I_D$	Continuous Drain current	TC =25°C	180	A
$P_D$	Maximum Power Dissipation	TC =25°C	120	W
$R_{θJC}$	Thermal Resistance Junction-to-Case (Note3)	1.04	° C/W	

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Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
<b>Static Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
V <sub>(BR)DSS</sub>	Drain- Source Breakdown Voltage	VGS=0V ID=250μA	40	--	--	V
I <sub>DSS</sub>	Zero Gate Voltage Drain current	VDS=40V,VGS=0V	--	--	1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	VGS=±20V,VDS=0V	--	--	±100	nA
V <sub>GS(TH)</sub>	Gate Threshold Voltage	VDS=VGS,ID=250μA	1.2	1.6	2.4	V
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance (Note4)	VGS=10V, ID=30A	--	1.3	1.8	mΩ
		VGS=4.5V, ID=20A	--	2.2	2.7	mΩ
<b>Dynamic Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated) (Note5)</b>						
C <sub>iss</sub>	Input Capacitance	VDS=20V, VGS=0V, F=1MHz	--	4067	--	pF
C <sub>oss</sub>	Output Capacitance		--	1134	--	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		--	110	--	pF
Q <sub>g</sub>	Total Gate Charge	VDS=20V, ID=40A, VGS=10V	--	79	--	nC
Q <sub>gs</sub>	Gate-Source Charge		--	10	--	nC
Q <sub>gd</sub>	Gate-Drain Charge		--	13	--	nC
<b>Switching Characteristics (Note5)</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	VDS=20V, ID=40A, RG=1.6Ω, VGS=10V	--	22	--	nS
t <sub>r</sub>	Turn-on Rise Time		--	11	--	nS
t <sub>d(off)</sub>	Turn-off Delay Time		--	95	--	nS
t <sub>f</sub>	Turn-off Fall Time		--	48	--	nS
<b>Source- Drain Diode Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)</b>						
V <sub>SD</sub>	Forward on voltage	IS=20A,VGS=0V	--	--	1.2	V

Note:

- Limited by T<sub>Jmax</sub>, starting T<sub>J</sub> = 25° C, R<sub>G</sub> =25Ω, V<sub>DS</sub> =30V, V<sub>GS</sub> =10V. Part not recommended for use above this value.
- Repetitive Rating: Pulse width limited by maximum junction temperature.
- Surface Mounted on FR4 Board, t ≤ 10 sec.
- Pulse Test: pulse width ≤ 300 us, duty cycle ≤ 2%.
- Guaranteed by design, not subject to production testing.



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Typical Performance Characteristics

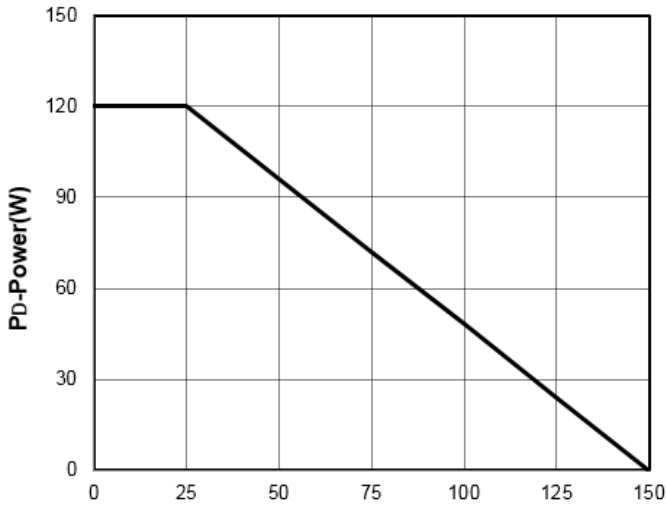


Figure1: T<sub>J</sub>-Junction Temperature (°C)

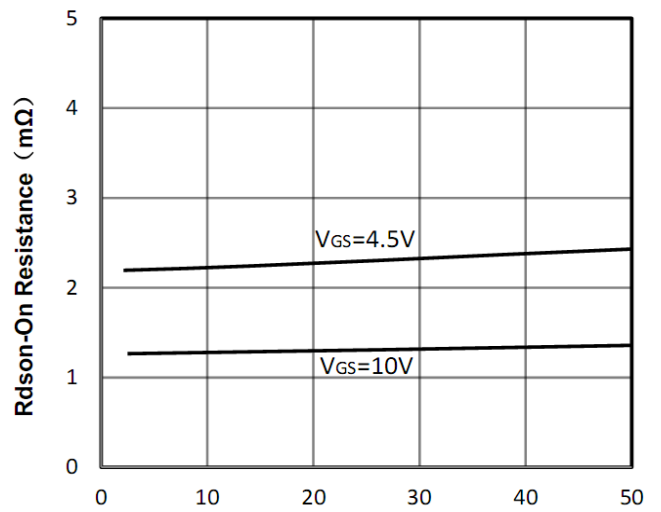


Figure2: I<sub>D</sub>-Drain Current (A)

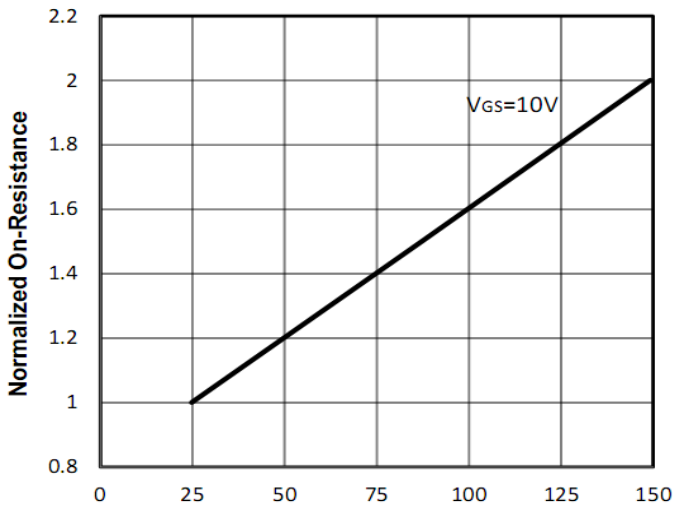


Figure3: T<sub>J</sub>-Junction Temperature (°C)

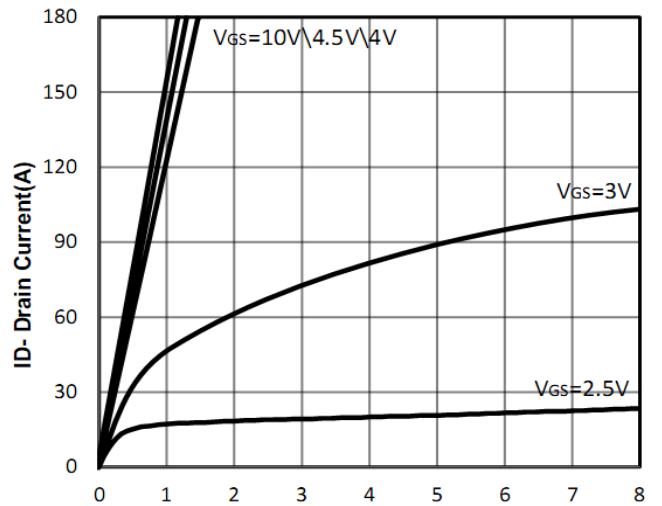


Figure4: V<sub>DS</sub>-Drain Source Voltage (V)

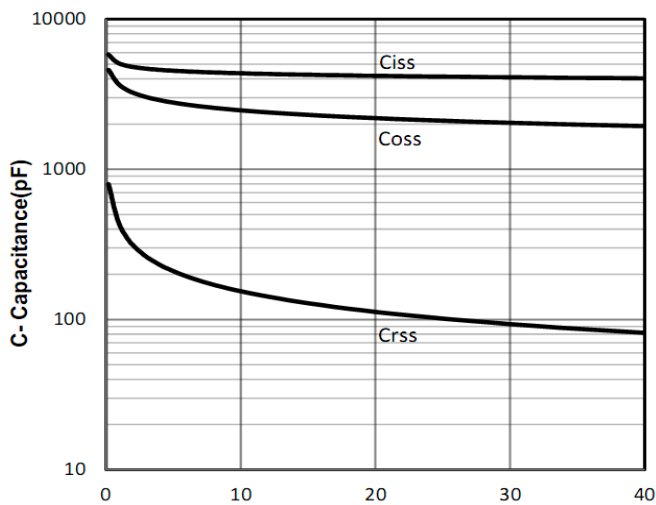


Figure5: V<sub>DS</sub>-Drain Source Voltage (V)

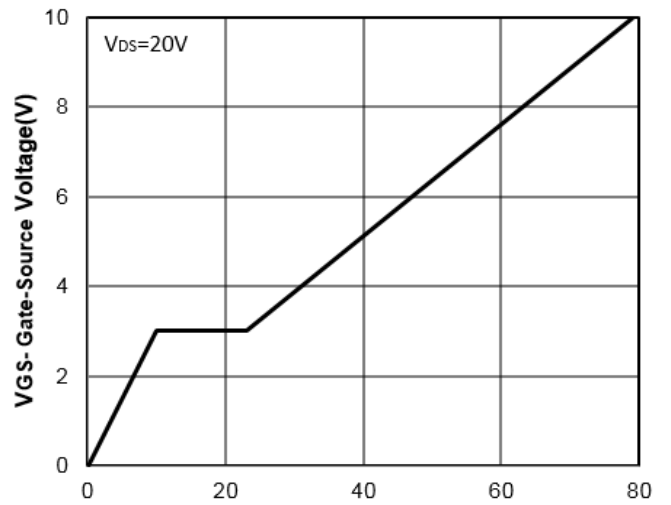


Figure6: Q<sub>g</sub>-Gate Charge (nC)



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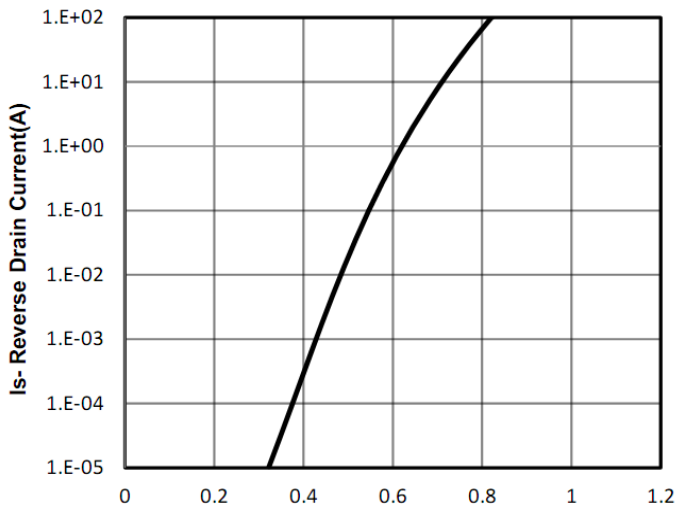


Figure7: Vsd –Source Drain Voltage (V)

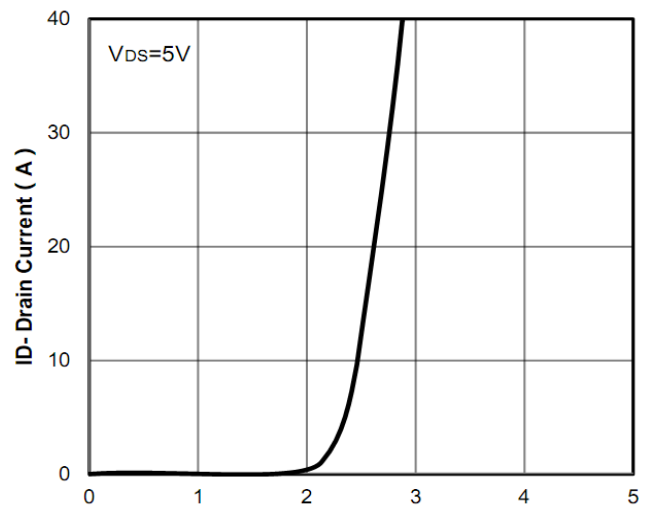


Figure8: Vgs –Gate Source Voltage (V)

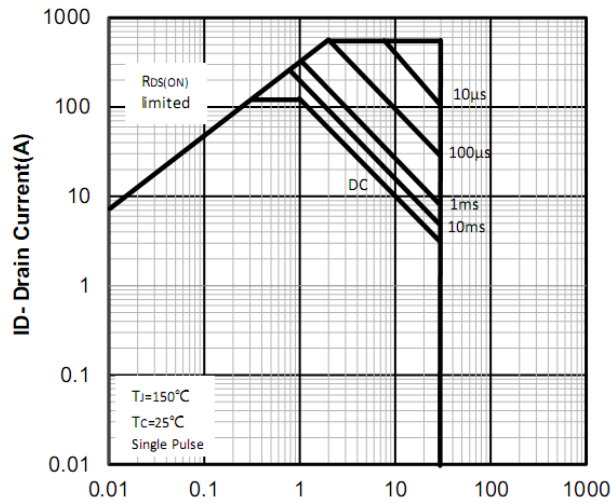


Figure9: VDS -Drain Source Voltage (V)

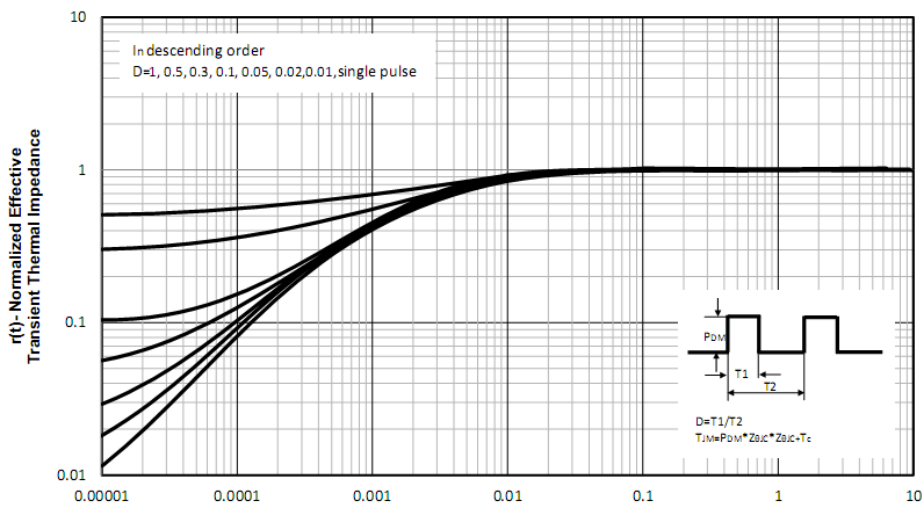
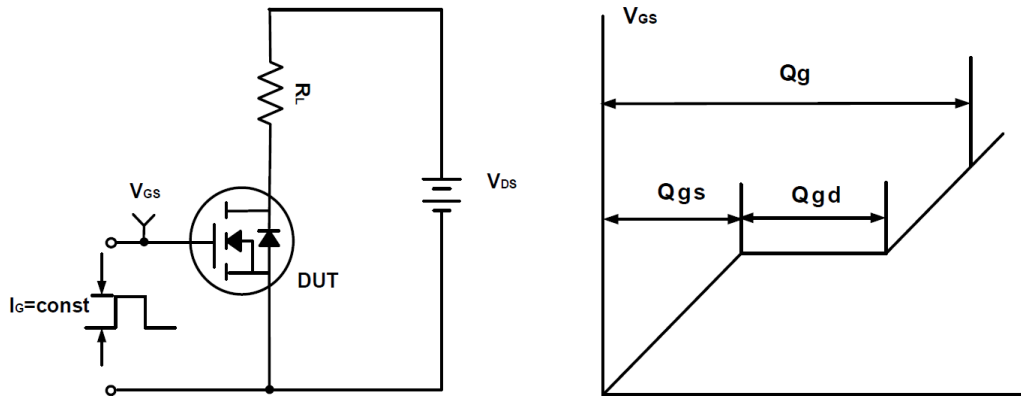
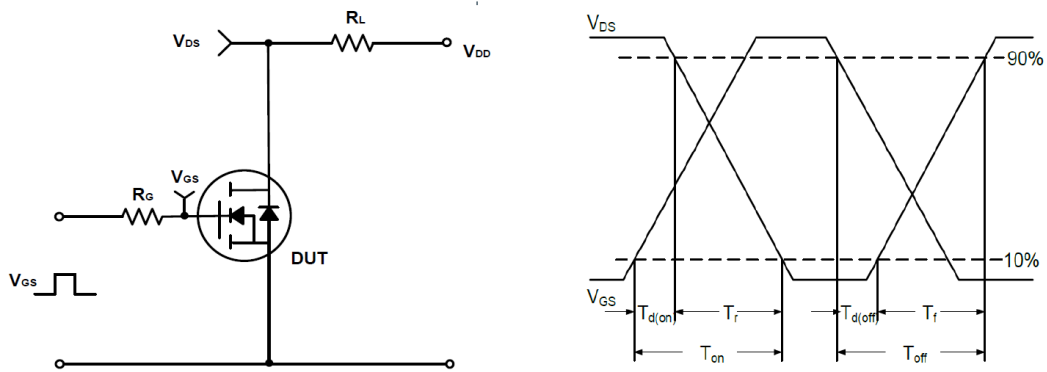
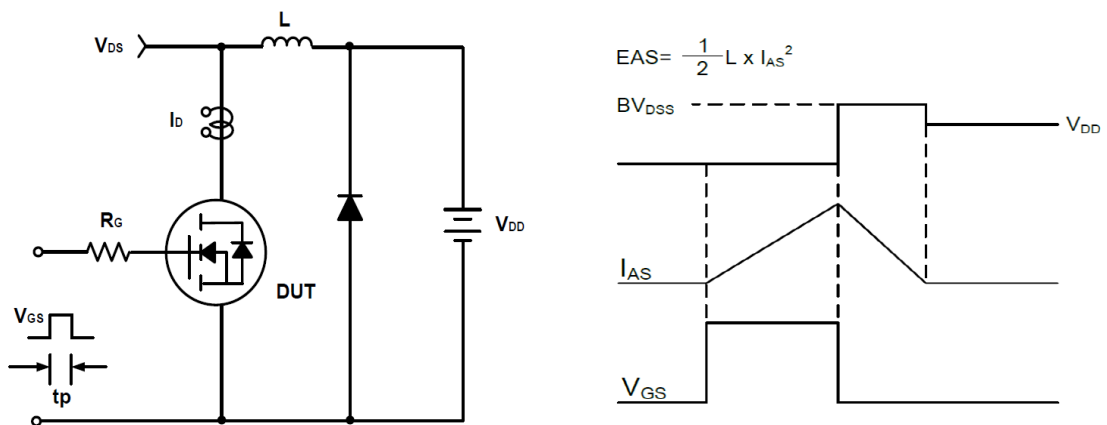


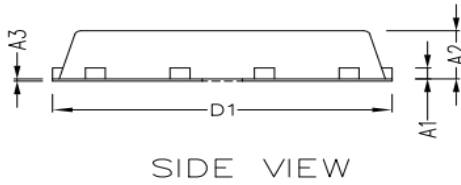
Figure10: Square Wave Pulse Duration (sec)

**40V/180A N-Channel Advanced Power MOSFET**
**Test Circuit and Waveform:**

**Figure A Gate Charge Test Circuit & Waveforms**

**Figure B Switching Test Circuit & Waveforms**

**Figure C Unclamped Inductive Switching Circuit & Waveforms**

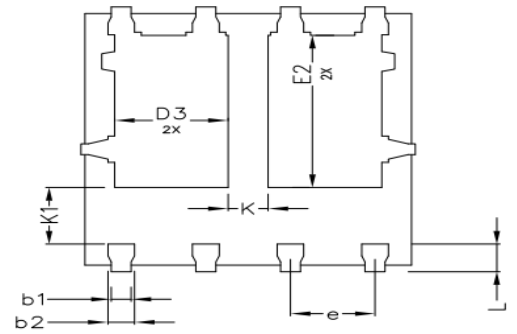


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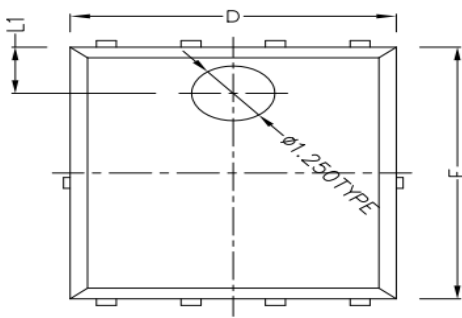
PDFN5X6-8L Package Outline Dimensions (Units: mm)



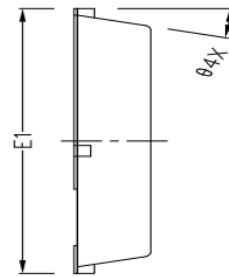
SIDE VIEW



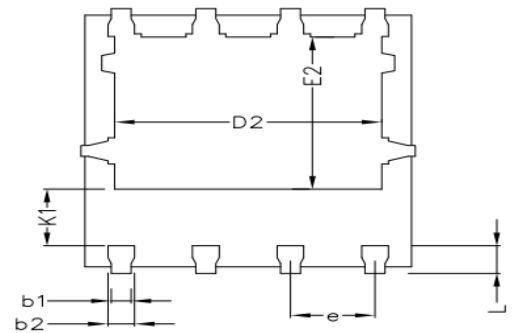
BOTTOM VIEW  
OPTION 2



TOP VIEW



SIDE VIEW



BOTTOM VIEW  
OPTION 1

COMMON DIMENSIONS (UNITS OF MEASURE IS mm)			
	MIN	NORMAL	MAX
A1	0.254 BSC		
A2	1.000	1.100	1.200
A3	0.005	-	0.020
b1	0.250	0.300	0.350
b2	0.350	0.400	0.450
D	4.800	4.900	5.000
D1	5.000	5.100	5.200
D2	3.910	4.010	4.110
D3	1.605	1.705	1.805
E	5.650	5.750	5.850
E1	5.950	6.050	6.150
E2	3.375	3.475	3.575
e	1.270 TYPE		
L	0.530	0.630	0.730
L1	1.00REF		
$\theta$	13° TYPE		
K	0.600 REF		
K1	1.235 REF		