

FH3406GS

N-Channel Enhancement Mode Power MOSFET

General Description

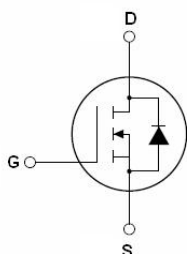
This N channel SGT MOSFET has been designed to very low on-state resistance ($R_{DS(ON)}$) and yet maintain superior switching performance, especially for high efficiency power management applications.

Applications

- DC-DC Conversion
- Power Tools
- Motor Driving
- Power Management

Features

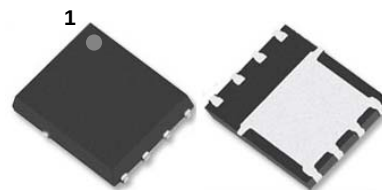
- $V_{DS} = 60V$, $I_D = 140A$
 $R_{DS(ON)}$ (Typ) : 2.1 m Ω @ $V_{GS} = -10V$
 $R_{DS(ON)}$ (Typ) : 3.0 m Ω @ $V_{GS} = -4.5V$
- N-channel, optimized for high-speed smooth switching
- Excellent Gate Charge $\times R_{DS(ON)}$ (FOM)
- Very low on-resistance



Schematic diagram



Marking and pin Assignment



PDFN5X6-8L top and bottom view

Maximum Ratings ($T_A = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Value	Units
V_{DS}	Drain-Source Voltage	60	V
I_D	Drain Current - Continuous ($T_C = 25^\circ C$) (Note 1)	140	A
	Drain Current -Continuous ($T_C = 100^\circ C$)	84	A
I_{DM}	Drain Current - Pulsed (Note 2)	500	A
V_{GS}	Gate-Source Voltage	± 20	V
E_{AS}	Single Pulsed Avalanche Energy (Note 3)	380	mJ
P_D	Power Dissipation ($T_C = 25^\circ C$)	34.8	W
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Steady-State	3.3	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient Steady-State (Note 4)	62.6	$^\circ C/W$

Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 250 μA	60			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 60 V, V _{GS} = 0 V, T _J = 25°C			1	uA
I _{GSS}	Gate Leakage Current	V _{GS} = ±20 V, V _{DS} = 0 V			±100	nA
V _{GS(TH)}	Gate Threshold voltage	V _{DS} = V _{GS} , I _D = 250 μA	1.0	2	2.5	V
R _{DS(ON)}	Drain-Source on-state resistance	V _{GS} = 10 V, I _D = 30 A		2.1	2.6	mΩ
		V _{GS} = 4.5 V, I _D = 15 A		3.0	3.8	
Dynamic Characteristics						
C _{ISS}	Input capacitance	V _{DS} = 30 V, V _{GS} = 0 V, F = 1 MHz		6046		pF
C _{OSS}	Output capacitance			1044		pF
C _{RSS}	Reverse transfer capacitance			115		pF
Switching Characteristics						
T _{D(ON)}	Turn On Delay Time	V _{DD} = 30 V, I _D = 25 A, V _{GS} = 10 V, R _G = 2 Ω		8		ns
T _R	RiseTime			15		ns
T _{D(OFF)}	Turn Off Delay Time			55		ns
T _F	Fall Time			25		ns
Q _G	Total Gate Charge	V _{DD} = 30 V, I _D = 25 A, V _{GS} = 10 V		112		nC
Q _{GS}	Gate-Source Charge			20		nC
Q _{GD}	Gate-Drain Charge			22		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Body-Diode Forward Current				140	A
I _{SM}	Maximum Pulsed Body-Diode Forward Current ^(NOTE 1)				500	A
V _{SD}	Diode Forward Voltage	V _{GS} = 0 V, I _S = 20 A		0.79		V
T _{RR}	Reverse recovery time	I _F = 20 A		72		ns
Q _{RR}	Reverse recovery charge	di/dt = 100 A/μS		100		nC

Notes:

1. The max drain current rating is limited by T_{JMAX}
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3. $L = 0.5\text{ mH}, V_{DD} = 20\text{ V}, I_{AS} = 39\text{ A}, R_G = 25\text{ }\Omega$, Starting $T_J = 25^\circ\text{C}$
4. Mount on minimum PCB layout

Electrical Characteristics Diagrams

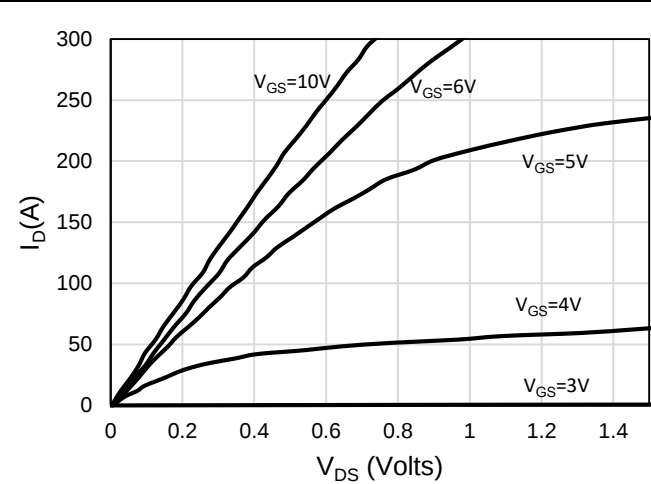


Figure 1: On-Region Characteristics

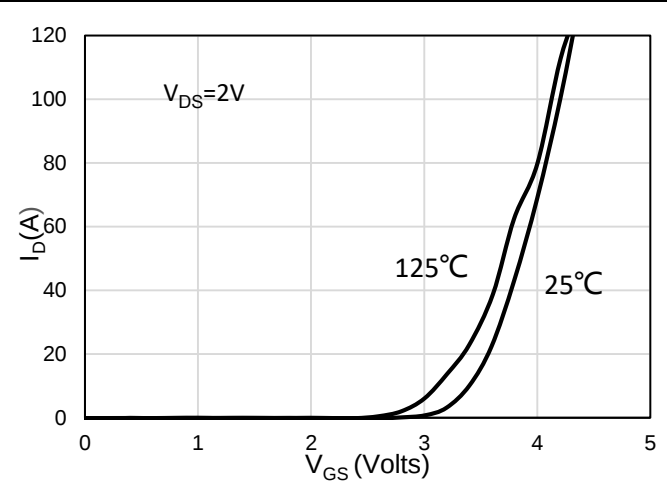


Figure 2: Transfer Characteristics

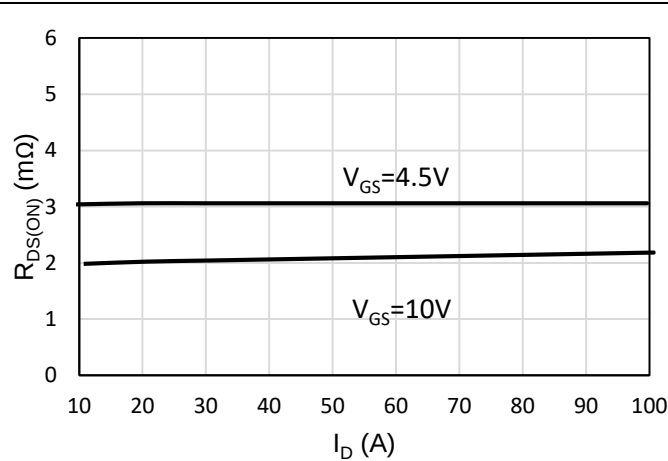


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

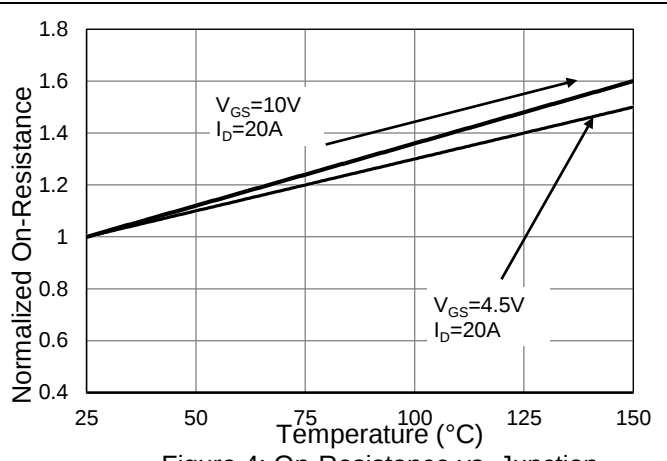


Figure 4: On-Resistance vs. Junction Temperature

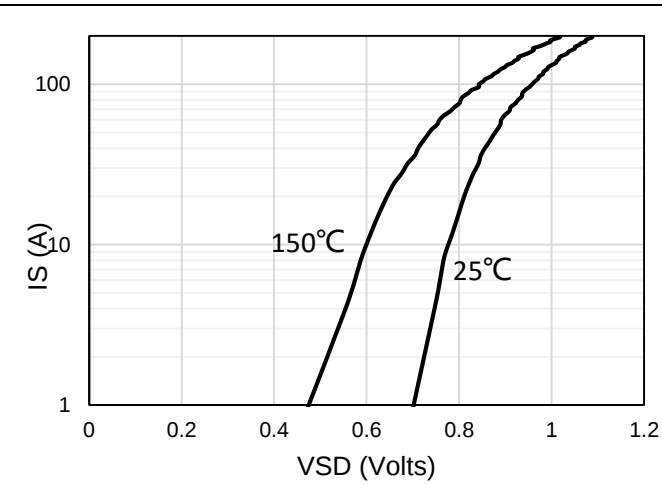


Figure 5: Body-Diode Characteristics

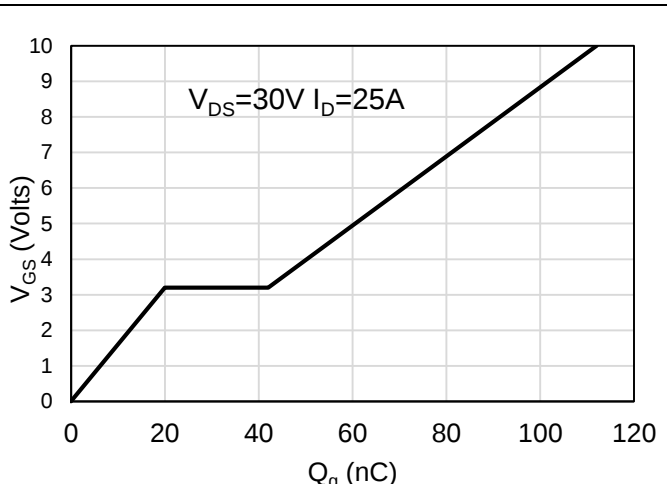
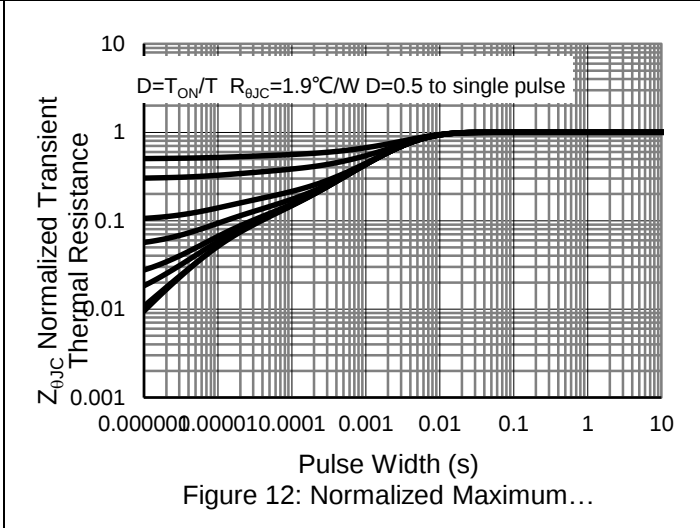
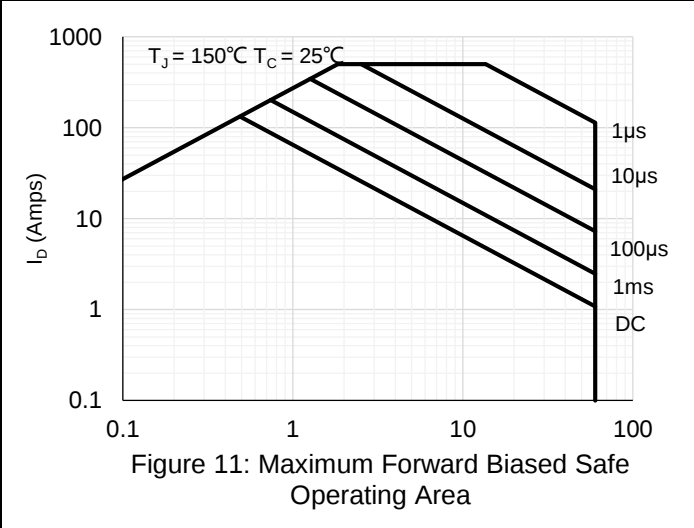
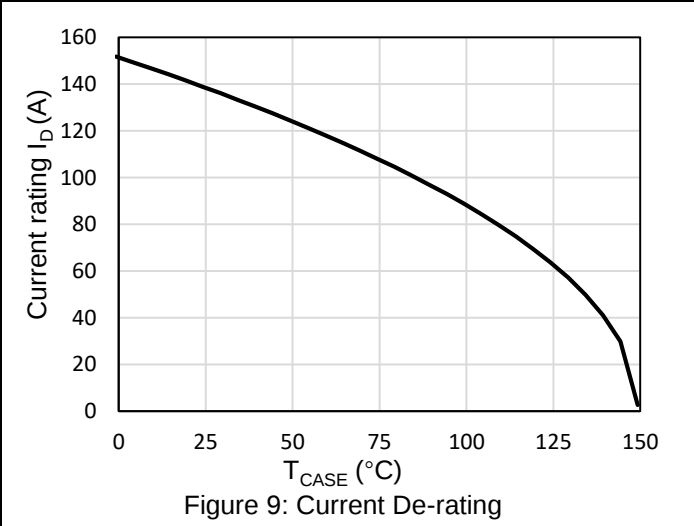
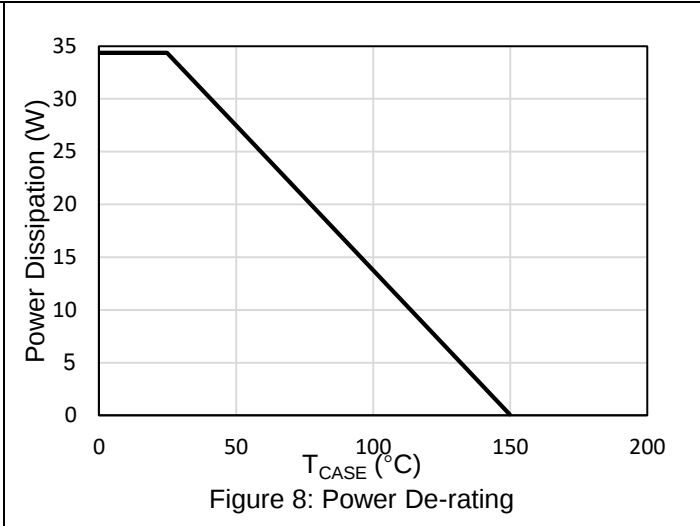
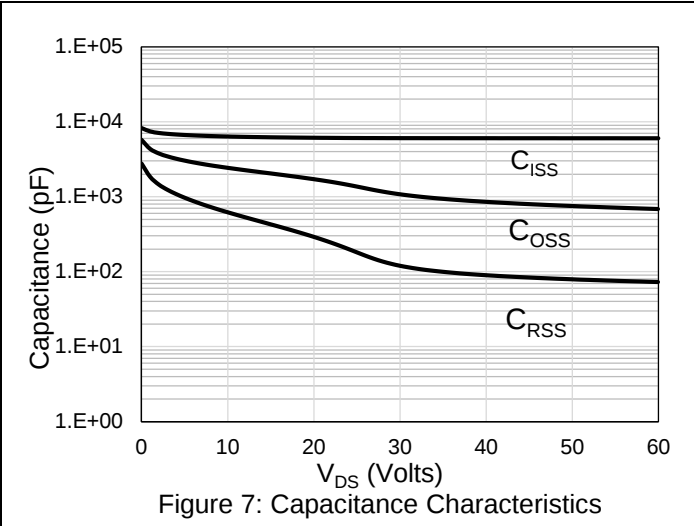
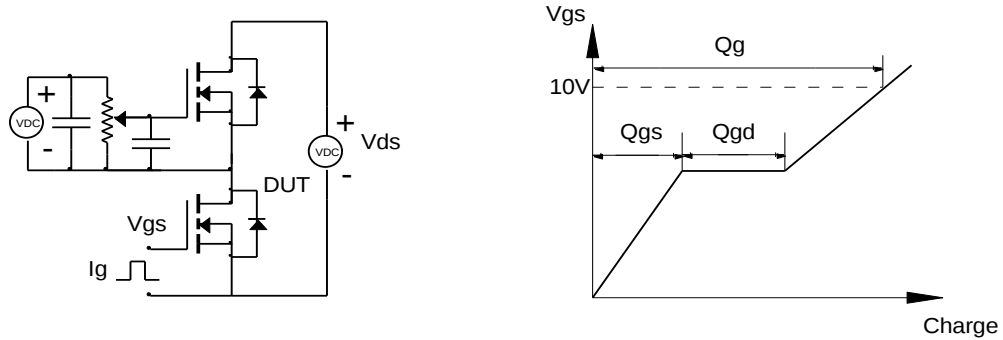


Figure 6: Gate-Charge Characteristics

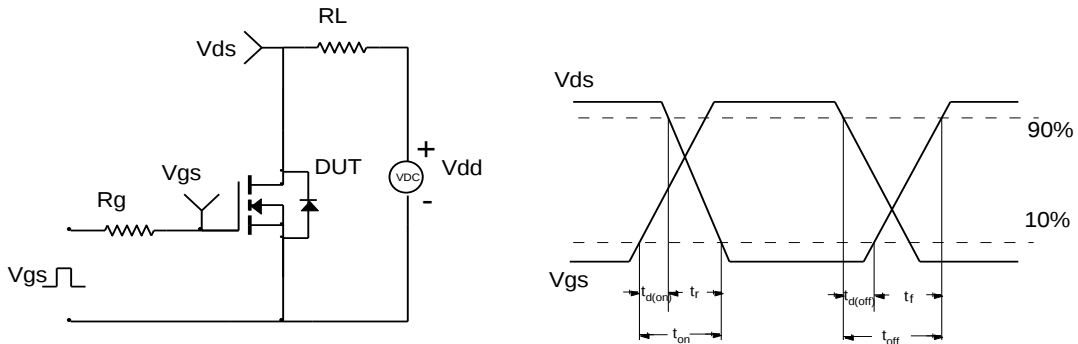


Test Circuit and Waveform

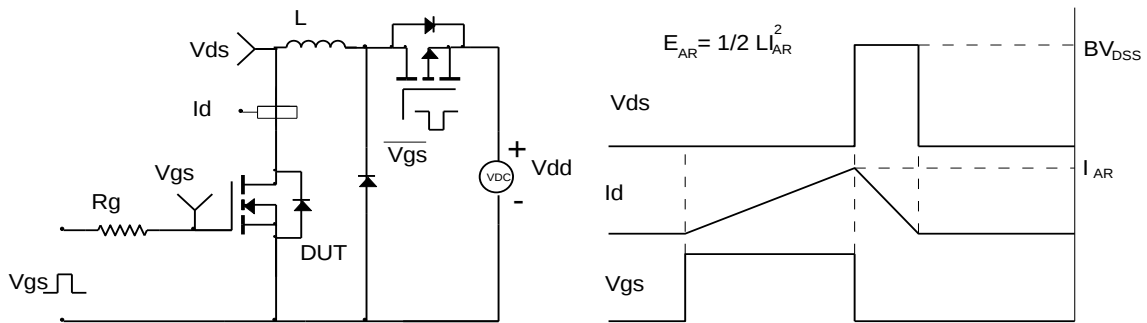
Gate Charge Test Circuit & Waveform



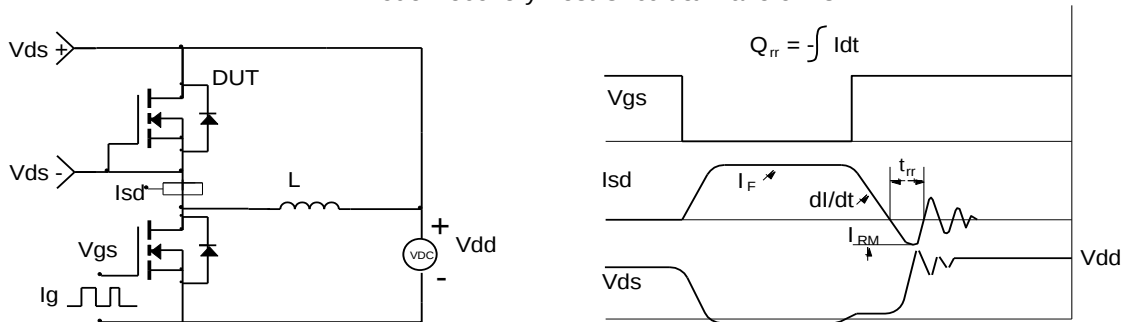
Resistive Switching Test Circuit & Waveforms



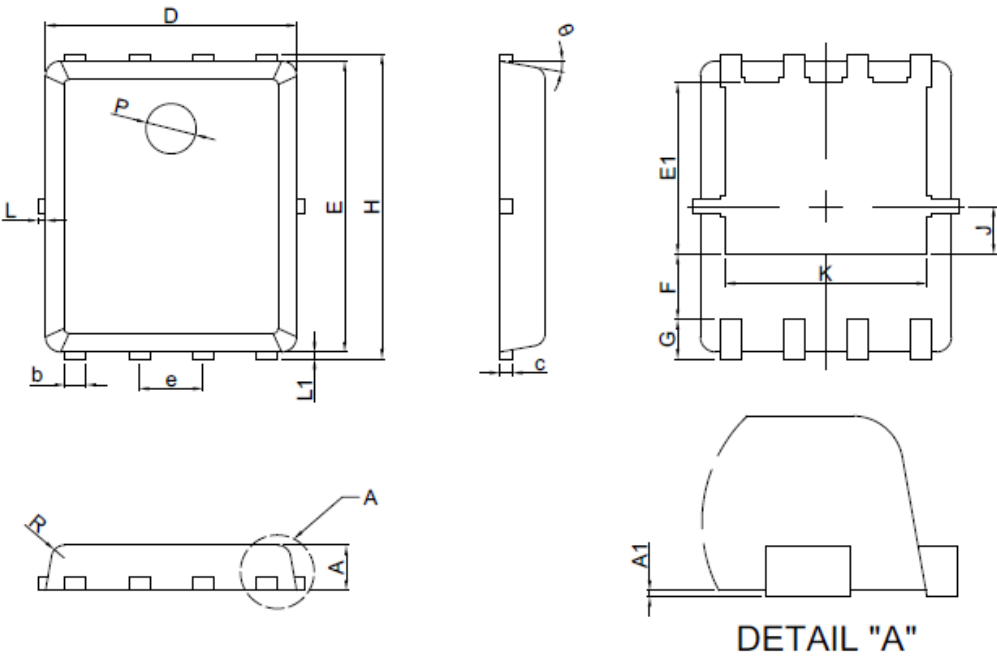
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Information :PDFN5x6-8L



Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	0.80	1.00
A1	0.00	0.05
b	0.35	0.49
c	0.254REF	
D	4.80	5.20
F	1.40REF	
E	5.60	5.90
e	1.27BSC	
H	5.80	6.20
L1	0.10	0.18
G	0.60REF	
K	4.00REF	
L	-	0.15
J	0.95BSC	
P	1.00REF	
E1	3.40REF	
θ	6°	14°
R	0.25REF	