

## N-Channel 60 V (D-S) MOSFET

### PRODUCT SUMMARY

$BV_{DSS}$	60V
$R_{DS(on)(MAX.)}$	0.0031 $\Omega$
$I_D$	180A

### FEATURES

- 100 %  $R_g$  Tested
- 100 % UIS Tested
- Material categorization

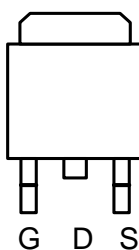


**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

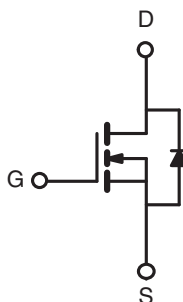
### APPLICATIONS

- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

### TO-263



Top View



N-Channel MOSFET

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current@10V	$I_D$	$T_C = 25\text{ }^\circ\text{C}$	180
		$T_C = 100\text{ }^\circ\text{C}$	101
Pulsed Drain Current	$I_{DM}$	641	A
Single Pulse Avalanche Energy	$E_{AS}$	189	mJ
Total Power Dissipation	$P_D$	112.6	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to +150	$^\circ\text{C}$

### Thermal Characteristics

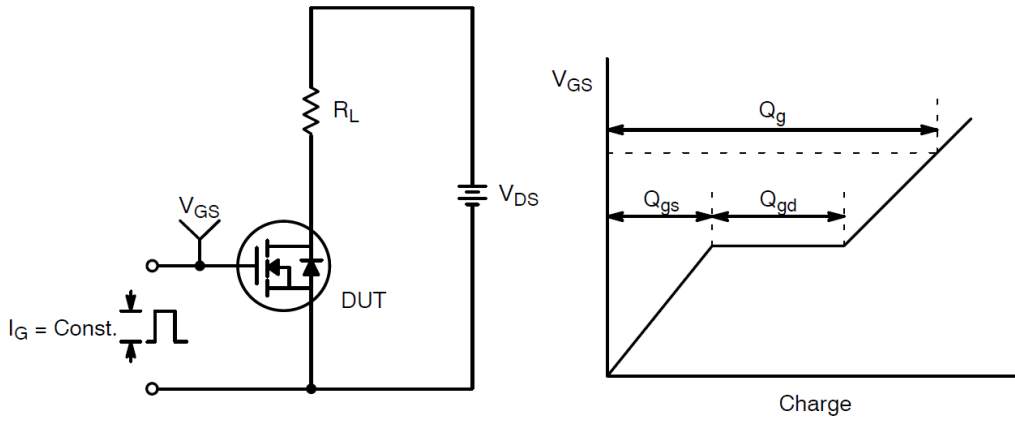
Parameter	Symbol	LIMIT.	Unit
Thermal resistance, junction-to-ambient	$R_{\theta JA}$	39.4	$^\circ\text{C} / \text{W}$
Thermal resistance, junction-to-case	$R_{\theta JC}$	1.1	

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

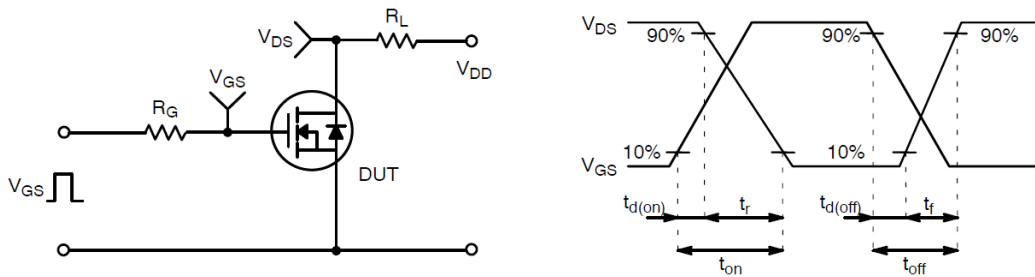
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}$ , $I_D = 250\ \mu\text{A}$	60	-	-	V
Gate-body Leakage current	$I_{GSS}$	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 60\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 25^\circ\text{C}$	-	-	1	$\mu\text{A}$
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = 250\ \mu\text{A}$	1		3	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$ , $I_D = 20\text{ A}$	-	0.00265	0.0031	$\Omega$
		$V_{GS} = 4.5\text{ V}$ , $I_D = 10\text{ A}$	-	0.003	0.0036	
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 30\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1\text{ MHz}$	-	4612	-	pF
Output Capacitance	$C_{oss}$		-	2190	-	
Reverse Transfer Capacitance	$C_{rss}$		-	68	-	
<b>Switching Characteristics</b>						
Gate Resistance	$R_g$	$f = 1\text{ MHz}$	-	0.93	-	$\Omega$
Total Gate Charge	$Q_g$	$V_{DS} = 30\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 40\text{ A}$	-	74.39	-	nC
Gate-Source Charge	$Q_{gs}$		-	17.28	-	
Gate-Drain Charge	$Q_{gd}$		-	9.46	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 30\text{ V}$ , $I_D \cong 40\text{ A}$ , $V_{GEN}$ $= 10\text{ V}$ , $R_G = 2.7\ \Omega$	-	14.15	-	nS
Rise Time	$t_r$		-	63.75	-	
Turn-Off Delay Time	$t_{d(off)}$		-	47	-	
Fall Time	$t_f$		-	105.09	-	
<b>Drain-Source Body Diode Characteristics</b>						
Diode Forward Voltage	$V_{SD}$	$I_S = 40\text{ A}$ , $V_{GS} = 0\text{ V}$	-	1	1.5	V
Continuous Source-Drain Diode Current	$I_S$	$T_J = 25^\circ\text{C}$	-	-	180	A
Continuous Source Current	$I_{SM}$		-	-	360	A
Reverse Recovery Charge	$Q_{rr}$	$T_J = 25^\circ\text{C}$ , $I_F = 40\text{ A}$ , $dI/dt = 300\text{ A}/\mu\text{s}$	-	56.33	-	nC
Reverse Recovery Time	$t_{rr}$		-	53	-	ns

**Notes:**

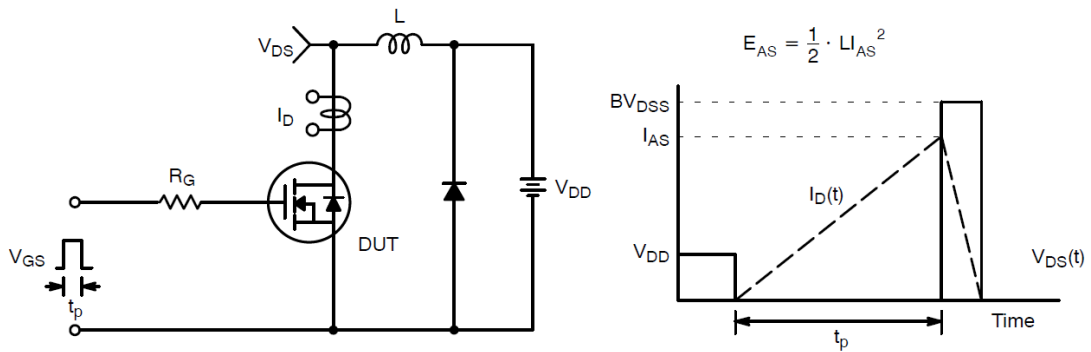
- Repetitive rating; pulse width limited by maximum junction temperature.
- $V_{DD}=30\text{V}$ ,  $L=0.3\text{mH}$ ,  $R_g=25\Omega$ , Starting  $T_J=25^\circ\text{C}$ .



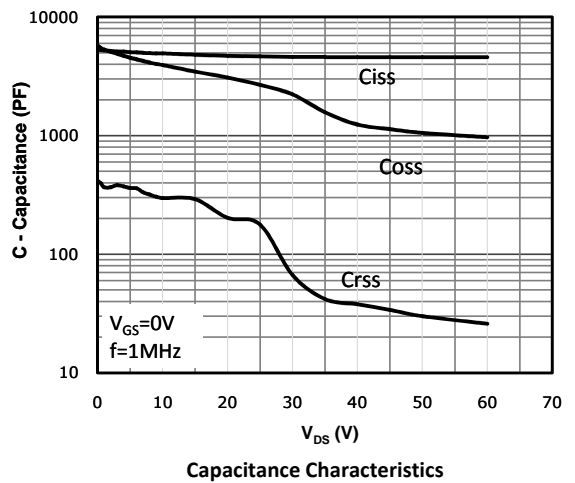
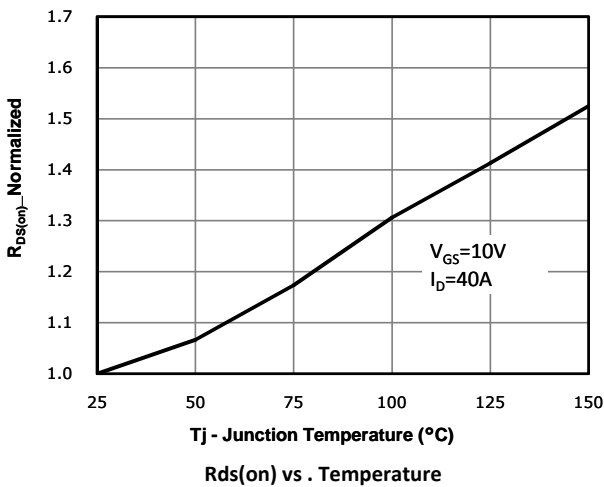
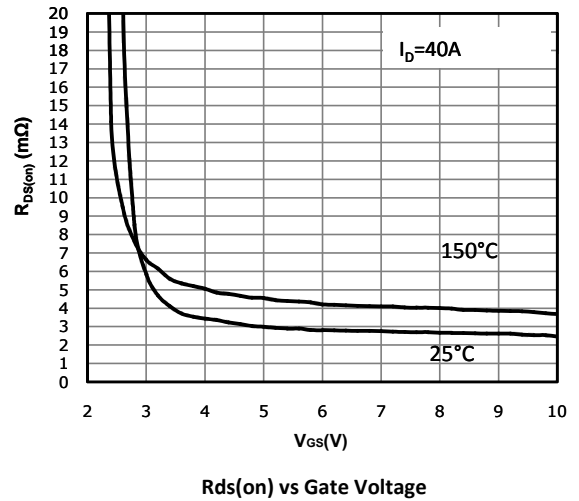
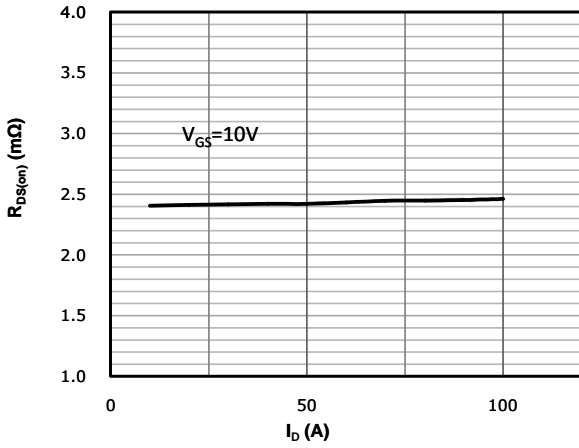
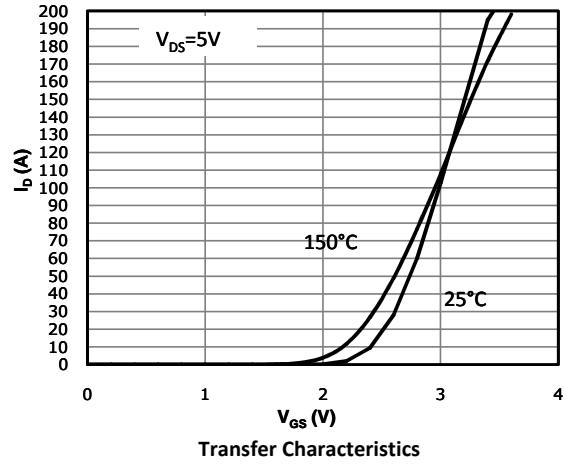
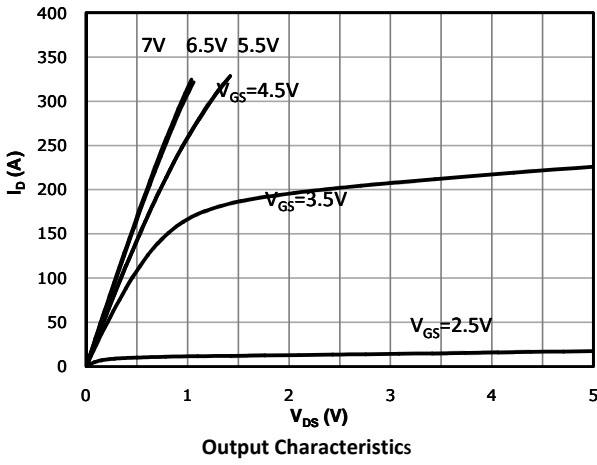
Gate Charge Test Circuit & Waveform

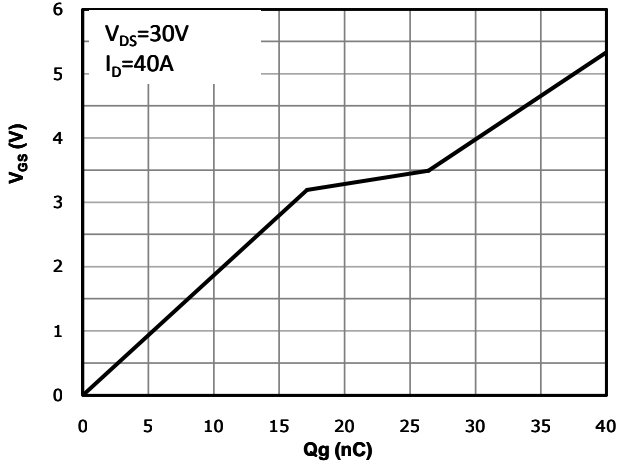


Resistive Switching Test Circuit & Waveforms

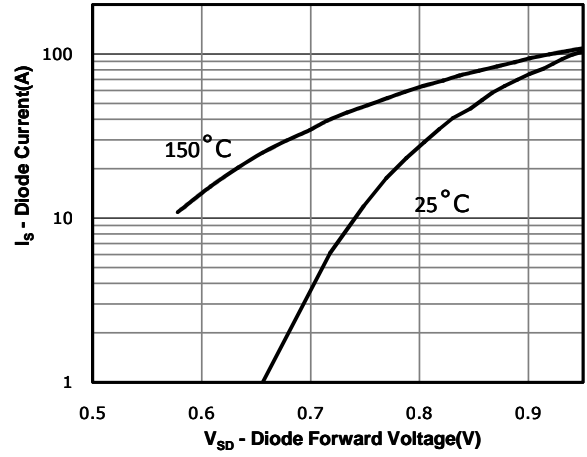


Unclamped Inductive Switching Test Circuit & Waveforms

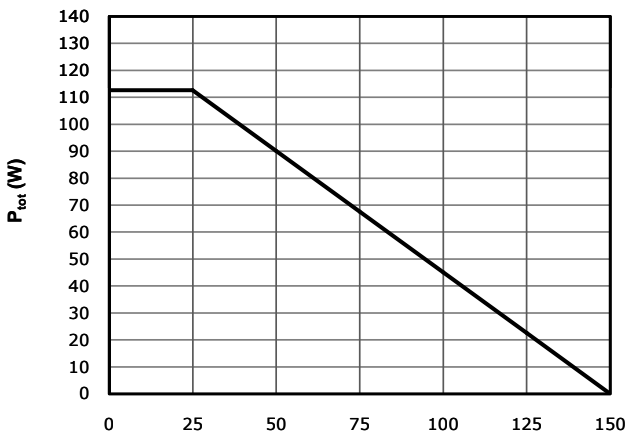




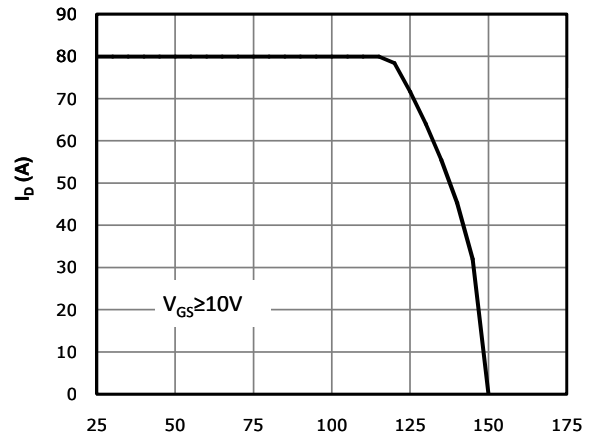
Gate Charge Characteristics



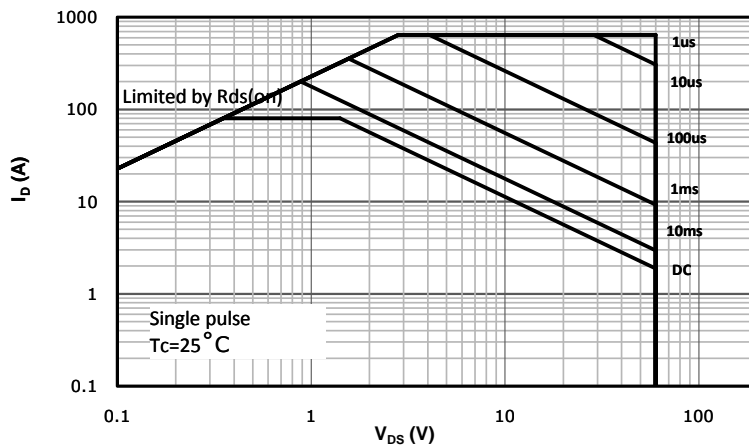
Body-diode Forward Characteristics



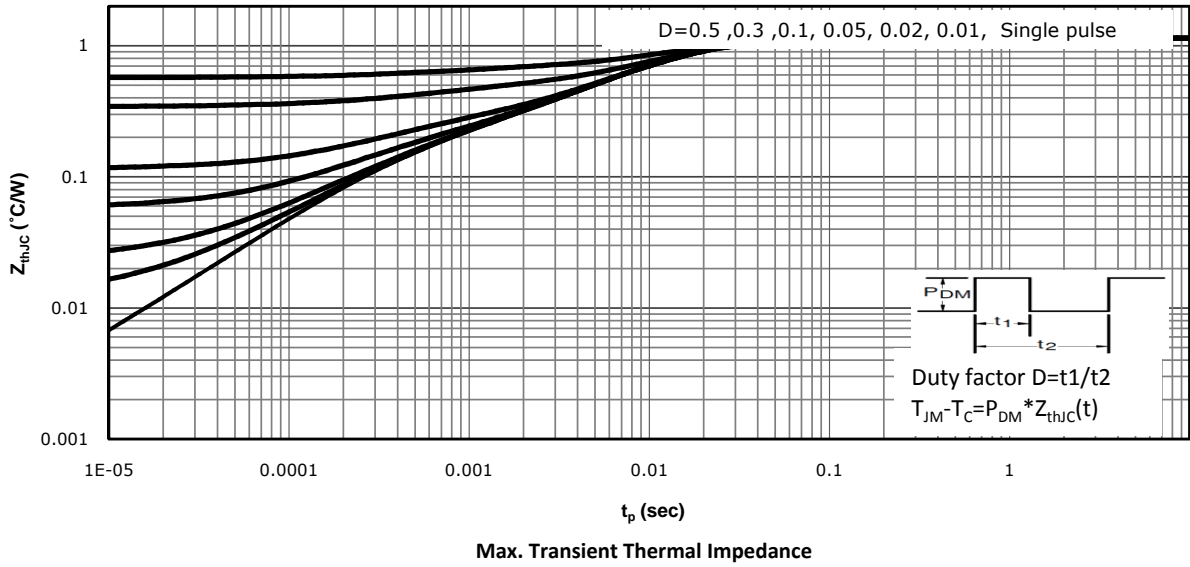
Power Dissipation



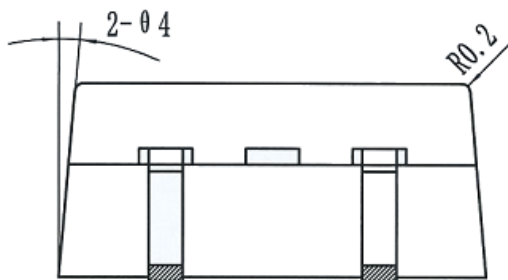
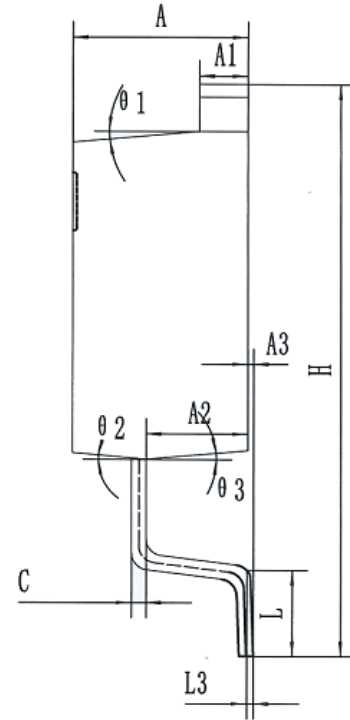
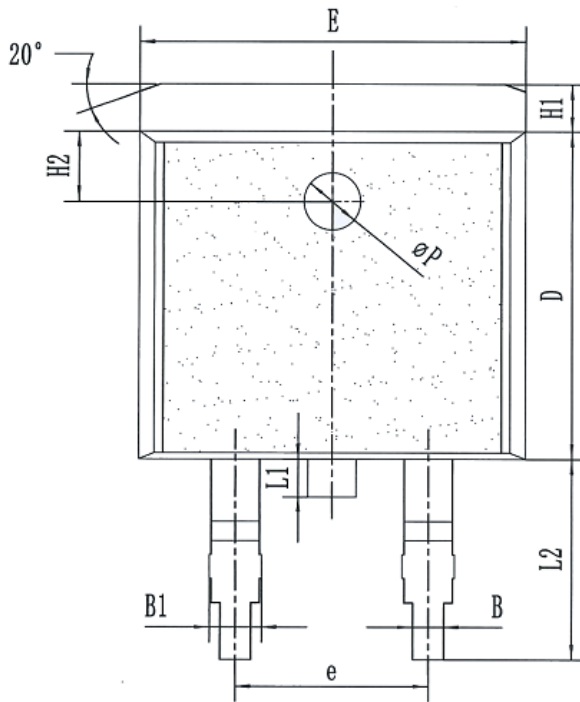
Drain Current Derating



Safe Operating Area



TO-263\_PACKGE OUYTLIN



COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	4.50	4.60	4.70
A1	1.22	1.27	1.32
A2	2.57	2.67	2.77
A3	0.00		0.15
B	0.76	0.81	0.87
B1	1.32	1.37	1.42
C	0.33	0.38	0.43
D	8.55	8.65	8.75
e	5.08 BSC		
E	10.06	10.16	10.26
H	14.80	15.00	15.20
H1	1.17	1.27	1.37
H2	1.85 REF		
L	2.09	2.39	2.69
L1	0.80	1.00	1.20
L2	4.88	5.08	5.28
L3	0.25 REF		
φP	1.40	1.50	1.60
θ 1	3°	5°	7°
θ 2	3°	5°	7°
θ 3	3°	5°	7°
θ 4	3°	5°	7°