



ASCENDSEMI

ASDM4406S

30V N-Channel MOSFET

Features

- High Efficiency
- Low Dense Cell Design
- Advanced trench process technology
- improved dv/dt capability
- Reliable and Rugged

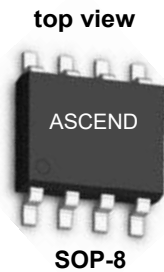
Application

- Networking, Load Switch
- LED lighting

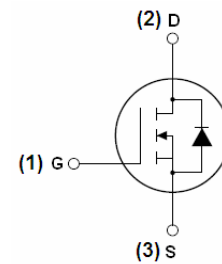
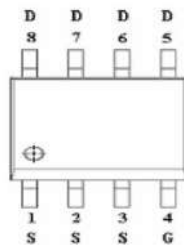
Product Summary



V_{DS}		30	V
$R_{DS(on),typ}$	$V_{GS}=10V$	9	mΩ
$R_{DS(on),typ}$	$V_{GS}=4.5V$	11.3	mΩ
I_D		13	A



Simplified Outline



Absolute Maximum Ratings at $T_J=25^{\circ}C$ (unless otherwise specified)

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current	I_D	$T_A=25^{\circ}C$	13
		$T_A=70^{\circ}C$	10.4
Pulsed Drain Current ^C	I_{DM}	52	A
Avalanche Current ^C	I_{AS}	13	A
Avalanche energy $L=0.1mH$ ^C	E_{AS}	24	mJ
Power Dissipation ^B	P_D	$T_A=25^{\circ}C$	3.1
		$T_A=70^{\circ}C$	2
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics					
Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	$t \leq 10s$	$R_{\theta JA}$	31	40	°C/W
Maximum Junction-to-Ambient ^{A D}	Steady-State		59	75	°C/W
Maximum Junction-to-Lead	Steady-State	$R_{\theta JL}$	16	24	°C/W



Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =250μA, V _{GS} =0V	30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =30V, V _{GS} =0V T _J =85°C			1 30	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±20V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} I _D =250μA	1.0	1.4	2.0	V
I _{D(ON)}	On state drain current	V _{GS} =10V, V _{DS} =5V	100			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =12A T _J =125°C		9.0 14	11.5 17	mΩ
		V _{GS} =4.5V, I _D =10A		11.3	14.0	mΩ
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =12A		45		S
V _{SD}	Diode Forward Voltage	I _S =1A, V _{GS} =0V		0.75	1	V
I _S	Maximum Body-Diode Continuous Current				4	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =15V, f=1MHz	610	760	910	pF
C _{oss}	Output Capacitance		88	125	160	pF
C _{rss}	Reverse Transfer Capacitance		40	70	100	pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	0.8	1.6	2.4	Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge	V _{GS} =10V, V _{DS} =15V, I _D =12A	11	14	17	nC
Q _g (4.5V)	Total Gate Charge		5	6.6	8	nC
Q _{gs}	Gate Source Charge		1.9	2.4	2.9	nC
Q _{gd}	Gate Drain Charge		1.8	3	4.2	nC
Q _{gs}	Gate Source Charge	V _{GS} =4.5V, V _{DS} =15V, I _D =12A	1.9	2.4	2.9	nC
Q _{gd}	Gate Drain Charge		1.8	3	4.2	nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =10V, V _{DS} =15V, R _L =1.25Ω, R _{GEN} =3Ω		4.4		ns
t _r	Turn-On Rise Time			9		ns
t _{D(off)}	Turn-Off DelayTime			17		ns
t _f	Turn-Off Fall Time			6		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =12A, di/dt=500A/μs	5.6	7	8	ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =12A, di/dt=500A/μs	6.4	8	9.6	nC

A. The value of R_{θJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A =25° C. The value in any given application depends on the user's specific board design.

B. The power dissipation P_D is based on T_{J(MAX)}=150° C, using ≤ 10s junction-to-ambient thermal resistance.

C. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150° C. Ratings are based on low frequency and duty cycles to keep initial T_J=25° C.

D. The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.

E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

F. These curves are based on the junction-to-ambient thermal impedance which is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, assuming a maximum junction temperature of T_{J(MAX)}=150° C. The SOA curve provides a single pulse rating.



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

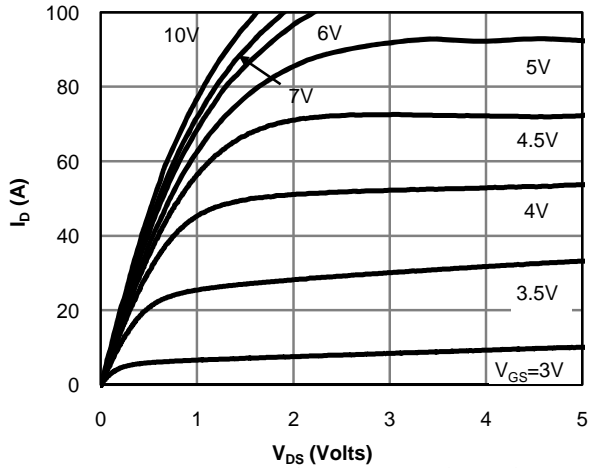


Fig 1: On-Region Characteristics (Note E)

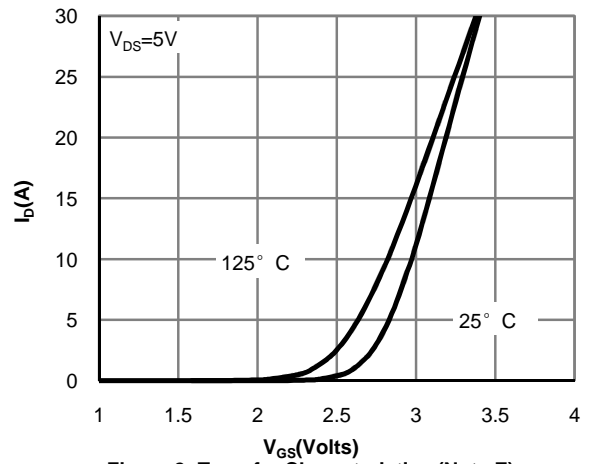


Figure 2: Transfer Characteristics (Note E)

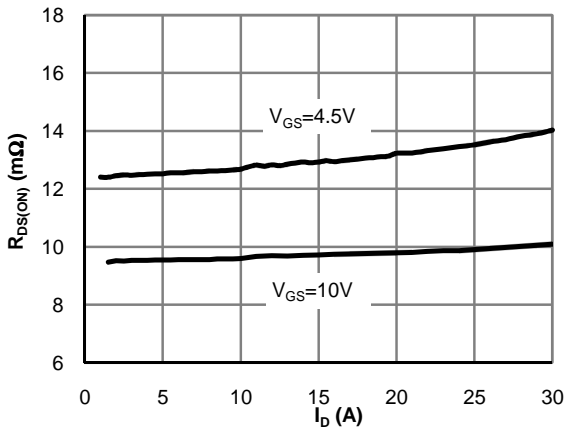


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

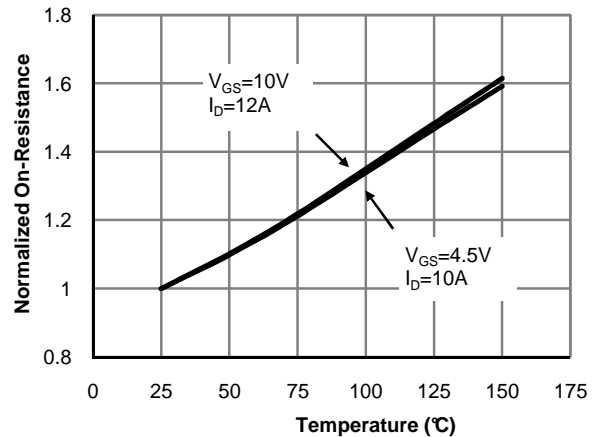


Figure 4: On-Resistance vs. Junction Temperature (Note E)

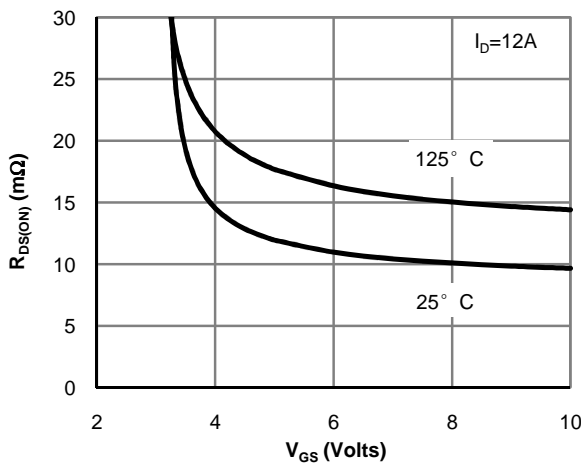


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

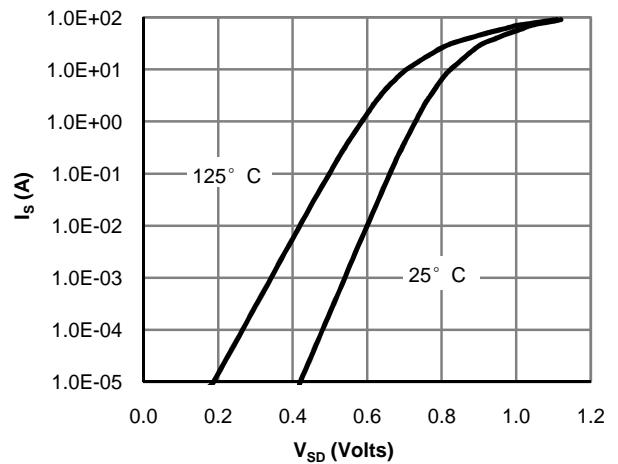


Figure 6: Body-Diode Characteristics (Note E)



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

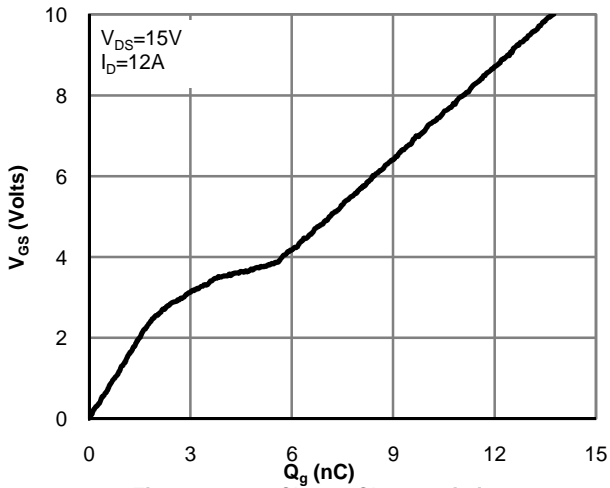


Figure 7: Gate-Charge Characteristics

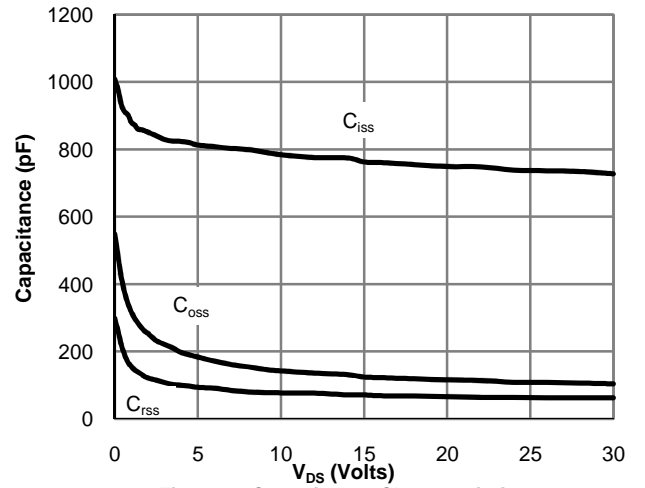


Figure 8: Capacitance Characteristics

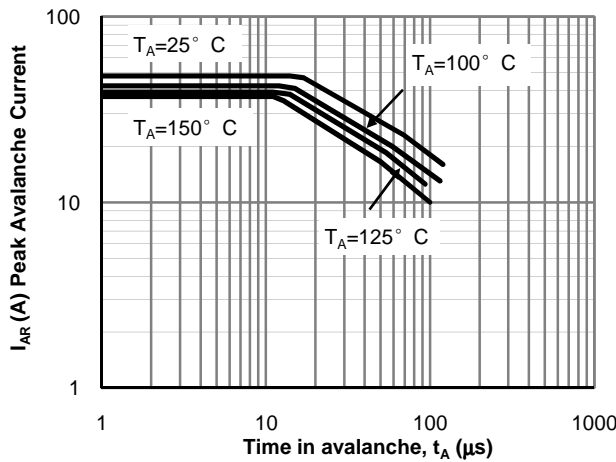


Figure 9: Single Pulse Avalanche capability (Note C)

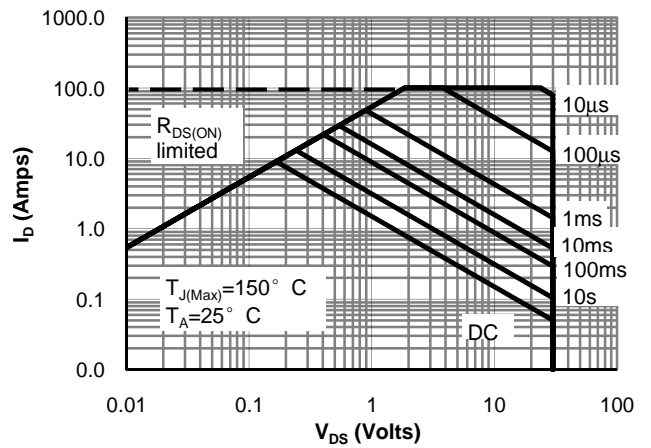


Figure 10: Maximum Forward Biased Safe Operating Area (Note F)

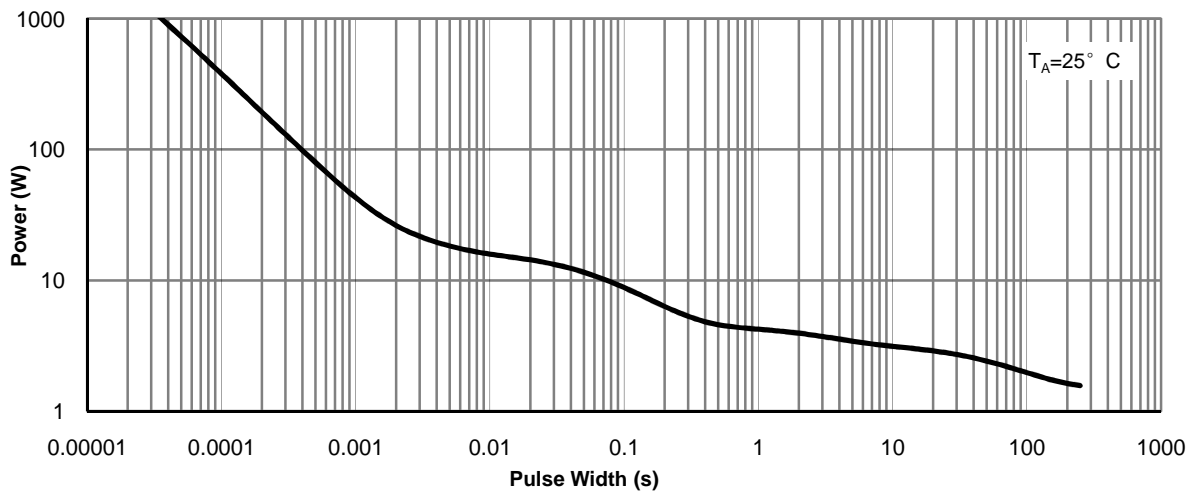


Figure 11: Single Pulse Power Rating Junction-to-Ambient (Note F)



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

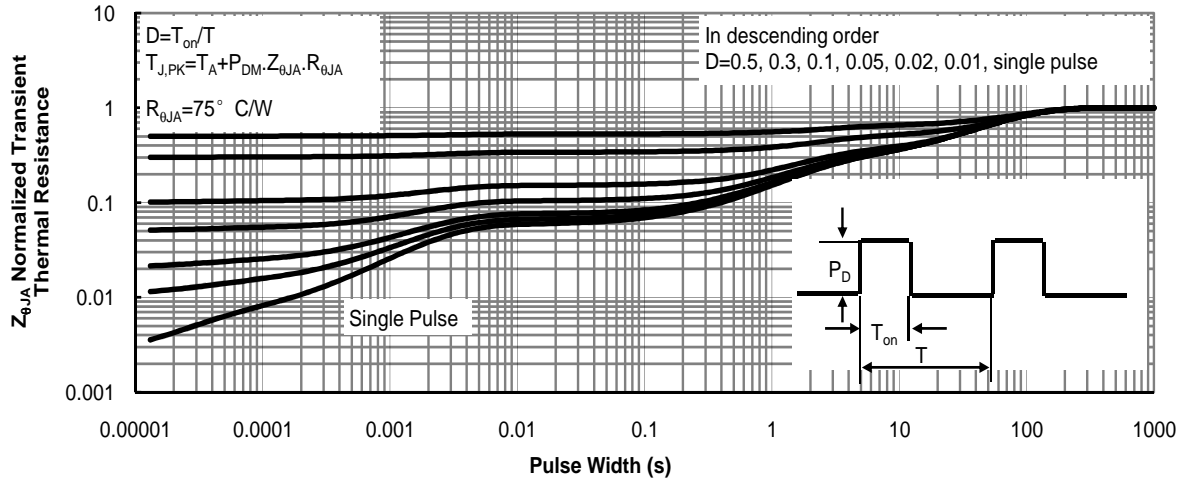
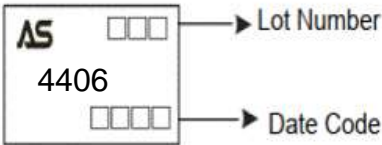


Figure 12: Normalized Maximum Transient Thermal Impedance (Note F)



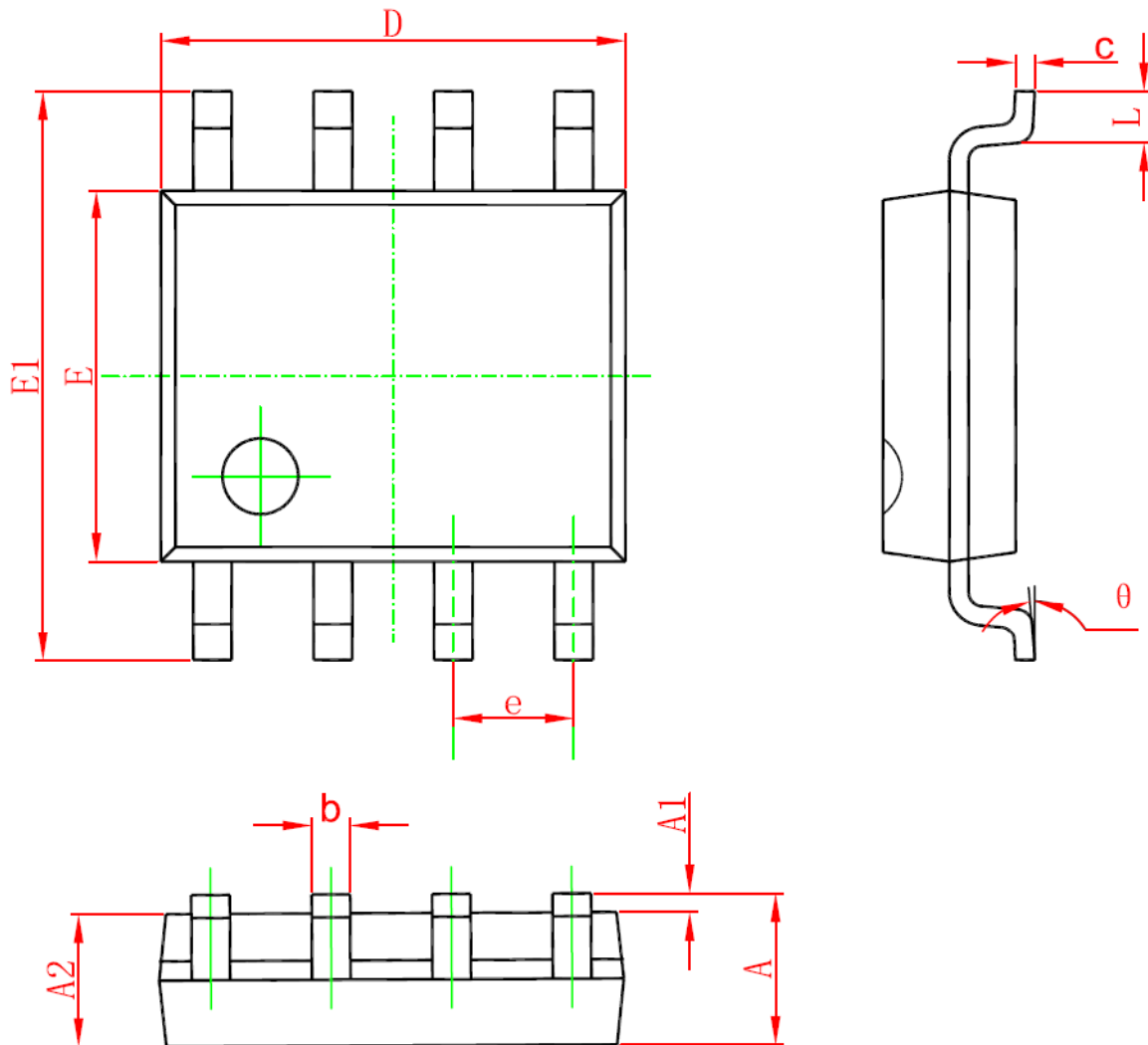
Ordering and Marking Information

Ordering Device No.	Marking	Package	Packing	Quantity
ASDM4406S-R	4406	SOP-8	Tape&Reel	4000

PACKAGE	MARKING
SOP-8	



SOP-8 PACKAGE IN FORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

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