

# N-Channel 150 V (D-S) Power MOSFET

## PRODUCT SUMMARY

V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (mΩ) (Typ.)	I <sub>D</sub> (A) <sup>a</sup>	Q <sub>g</sub> (Typ.)
150	4.5 at V <sub>GS</sub> = 10 V	164	46 nC

## FEATURES

- DT-SGT Power MOSFET
- 100 % R<sub>g</sub> and UIS tested
- Low On-Resistance

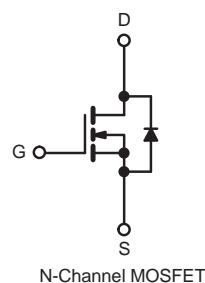
## APPLICATIONS

- DC/DC in Telecoms and Industrial
- Synchronous Rectification in SMPS
- Hard Switching and High Speed Circuit


**RoHS**  
 COMPLIANT

## TO-220 Pin Configuration

Top View



## ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub> = 25 °C, unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	V <sub>DS</sub>	150	V
Gate-Source Voltage	V <sub>GS</sub>	± 20	
Continuous Drain Current (T <sub>J</sub> = 175 °C) <sup>a</sup>	I <sub>D</sub>	164	A
		116	
Pulsed Drain Current <sup>b</sup>	I <sub>DM</sub>	655	
Single Avalanche Energy	E <sub>AS</sub>	1796	mJ
Maximum Power Dissipation <sup>c</sup>	P <sub>D</sub>	333	W
		167	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to +175	°C

## THERMAL RESISTANCE RATINGS

PARAMETER	SYMBOL	LIMIT	UNIT
Junction-to-Ambient (PCB Mount) <sup>d</sup>	R <sub>thJA</sub>	31	°C/W
Junction-to-Case (Drain)	R <sub>thJC</sub>	0.45	

## Notes

- Calculated continuous current based on maximum allowable junction temperature.
- Repetitive rating; pulse width limited by max. junction temperature.
- P<sub>D</sub> is based on max. junction temperature, using junction-case thermal resistance.
- The value of R<sub>thJA</sub> is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T<sub>a</sub>=25 °C.

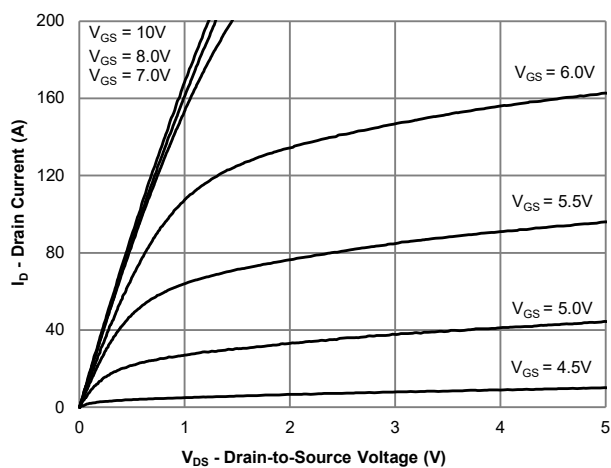
SPECIFICATIONS (T <sub>C</sub> = 25 °C, unless otherwise noted)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	150	-	-	V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	2.5	-	4.5	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V	-	-	± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 150 V, V <sub>GS</sub> = 0 V	-	-	1	μA
		V <sub>DS</sub> = 120 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 100 °C	-	-	100	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> ≥ 5 V, V <sub>GS</sub> = 10 V	164	-	-	A
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A	-	4.5	5.4	mΩ
Forward Transconductance <sup>a</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 20 A	-	56	-	S
Dynamic <sup>b</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 75 V, f = 1 MHz	-	3055	-	pF
Output Capacitance	C <sub>oss</sub>		-	768	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	14	-	
Total Gate Charge <sup>c</sup>	Q <sub>g</sub>	V <sub>DS</sub> = 75 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A	-	46	-	nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>		-	13.5	-	
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>		-	11.4	-	
Gate Resistance	R <sub>g</sub>	f = 1 MHz	-	3	-	Ω
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 75 V, I <sub>D</sub> = 20 A, R <sub>g</sub> = 3 Ω V <sub>GS</sub> = 10 V	-	7.6	-	ns
Rise Time <sup>c</sup>	t <sub>r</sub>		-	29	-	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>		-	32	-	
Fall Time <sup>c</sup>	t <sub>f</sub>		-	29	-	
Drain-Source Body Diode Ratings and Characteristics <sup>b</sup> (T <sub>C</sub> = 25 °C)						
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C	-	-	164	A
Pulsed Current	I <sub>SM</sub>		-	-	655	A
Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>F</sub> = 1 A, V <sub>GS</sub> = 0 V	-	-	1.2	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 20 A, di/dt = 100 A/μs	-	100	-	ns
Reverse Recovery Charge	Q <sub>rr</sub>		-	399	-	nC

**Notes**

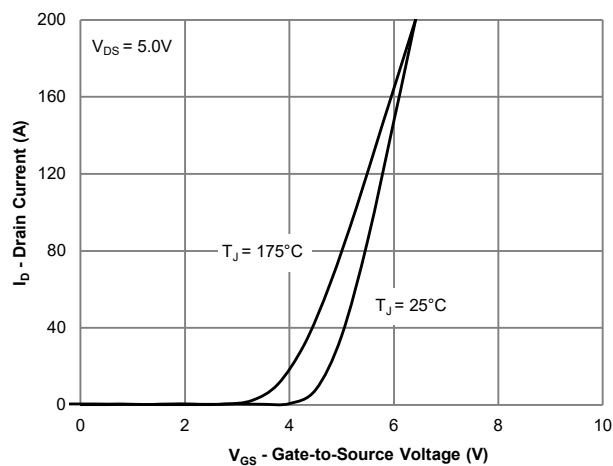
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
 b. Guaranteed by design, not subject to production testing.  
 c. Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

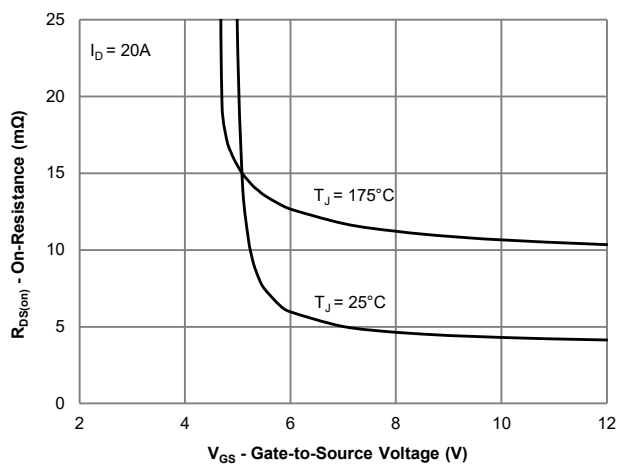
**TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)**



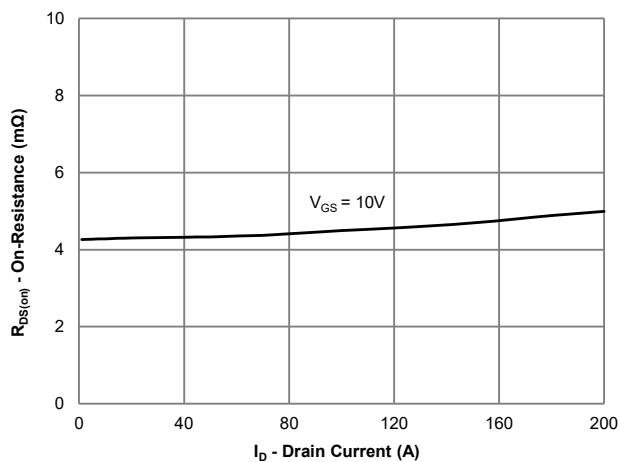
**Figure 1: Output Characteristics**



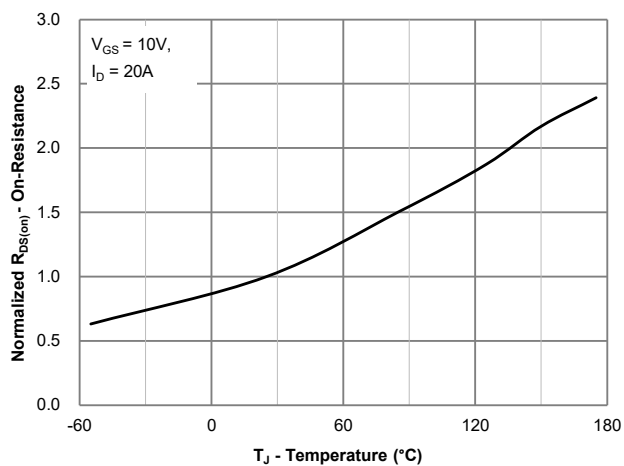
**Figure 2: Transfer Characteristics**



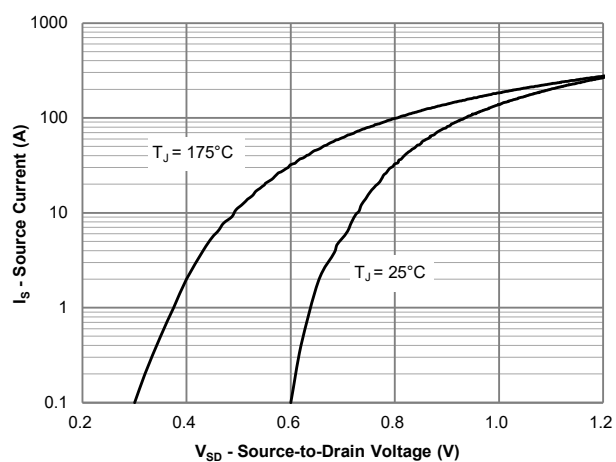
**Figure 3: On-Resistance vs. Gate-Source Voltage**



**Figure 4: On-Resistance vs. Drain Current**

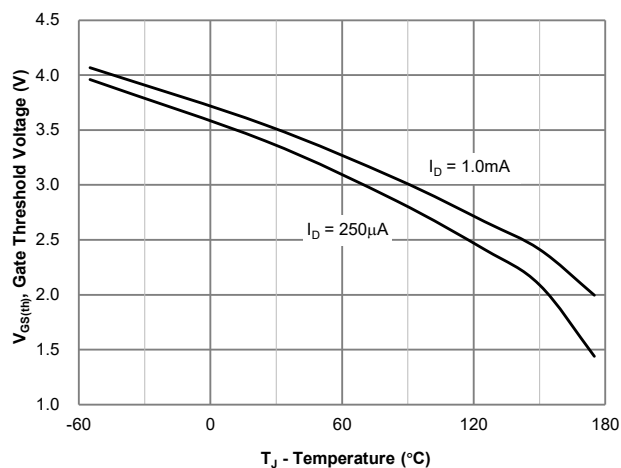


**Figure 5: On-Resistance vs. Junction Temperature**

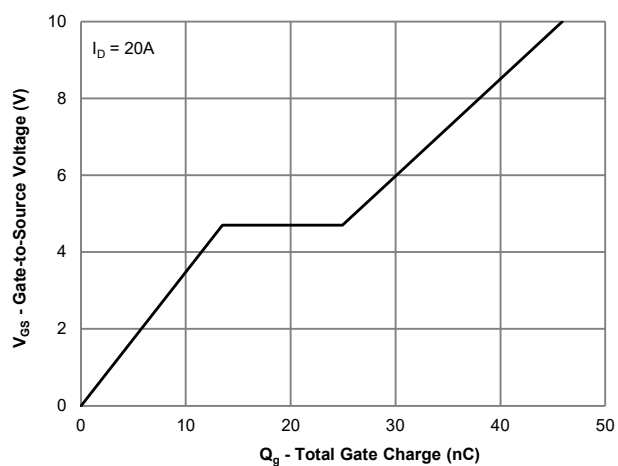


**Figure 6: Source-Drain Diode Forward Voltage**

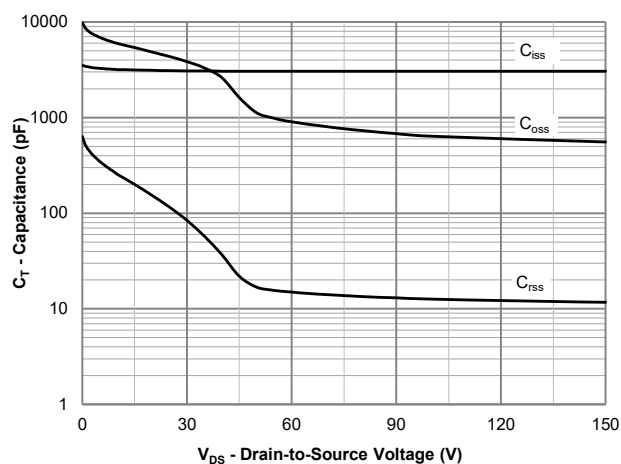
**TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)**



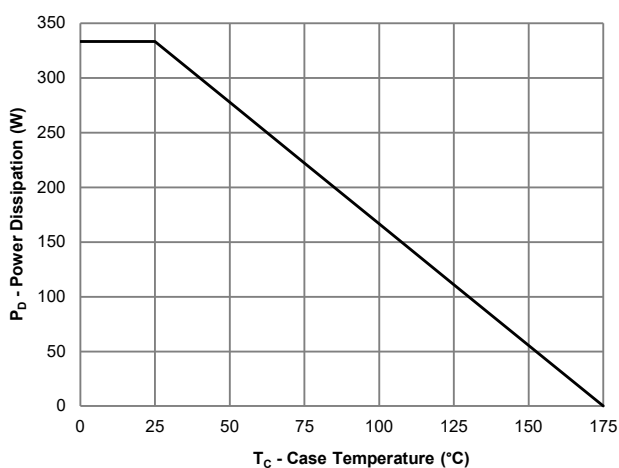
**Figure 7: Gate Threshold Variation vs. Junction Temperature**



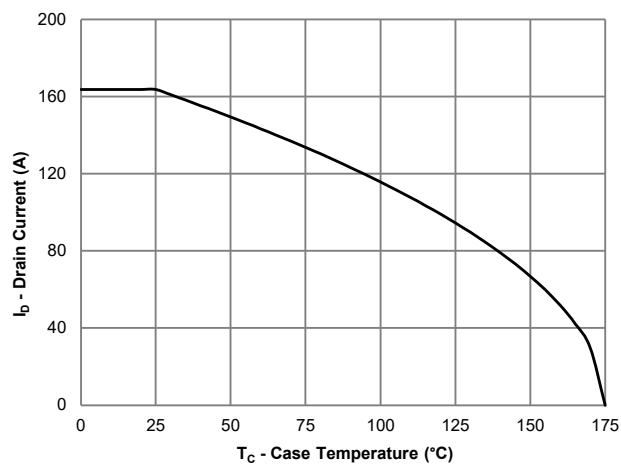
**Figure 8: Gate Charge Characteristics**



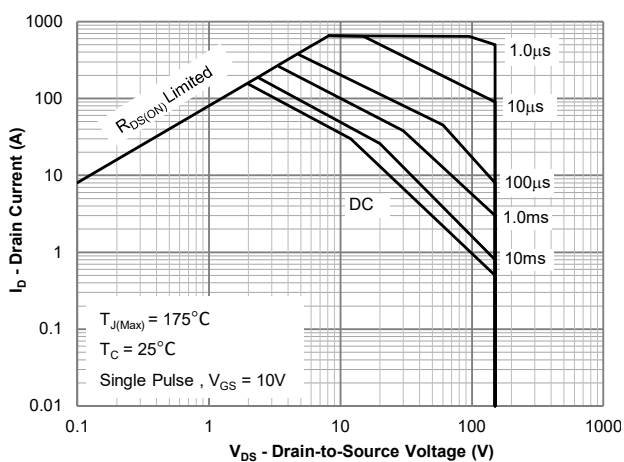
**Figure 9: Capacitance Characteristics**



**Figure 10: Power Derating**



**Figure 11: Current Derating**



**Figure 12: Safe Operating Area**

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

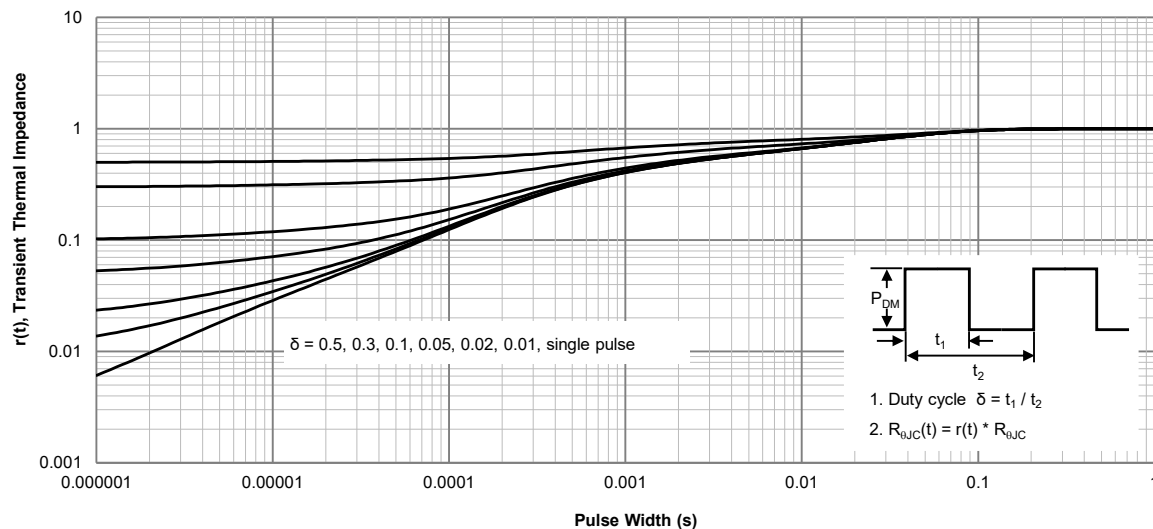
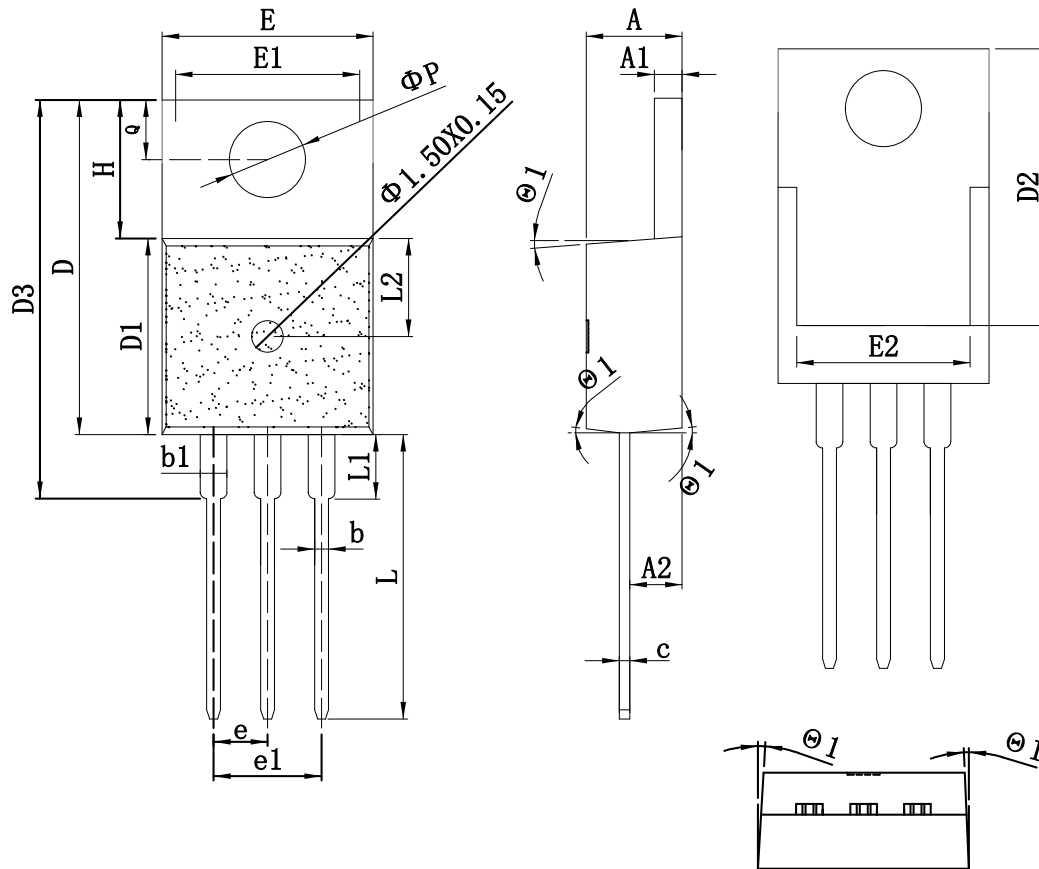


Figure 13: Normalized Maximum Transient Thermal Impedance



# TO-220\_3L-B PACKAGE OUTLINE



COMMON DIMENSIONS  
(UNITS OF MEASURE=mm)

SYMBOL	mm			SYMBOL	mm		
	MIN	TYP	MAX		MIN	TYP	MAX
A	4.15	4.50	4.80	E1	8.25	8.70	9.15
A1	1.15	1.30	1.50	E2	7.20	8.00	8.80
A2	2.10	2.40	2.65	e	2.38	2.54	2.74
b	0.65	0.80	1.00	e1	5.08 REF		
b1	1.10	1.33	1.80	H	6.20	6.50	6.90
c	0.35	0.50	0.65	L	12.75	13.28	13.70
D	14.25	15.75	16.15	L1	-	-	3.50
D1	8.70	9.20	9.60	L2	2.30	4.65	7.00
D2	12.30	13.10	13.85	$\phi P$	3.40	3.65	3.85
D3	16.20	18.80	20.60	Q	2.50	2.80	3.00
E	8.68	10.02	11.00	$\theta$	2°	-	7°

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