

## Description

The PSJMT065R650 is a high voltage MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

### MOSFET Product Summary

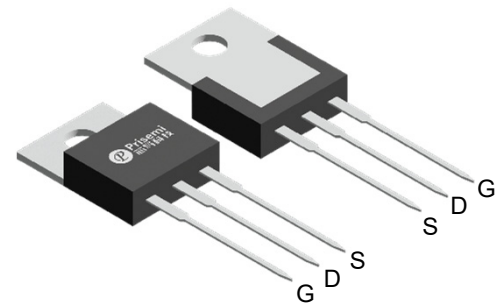
$V_{DS}(V)$	$R_{DS(on)}(m\Omega)$	$I_D(A)$
650	519@ $V_{GS} = 10V$	7.0

## Feature

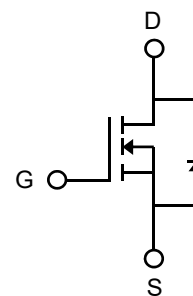
- Fast Switching Capability
- Lead free product is acquired.
- Avalanche Energy Tested

## Applications

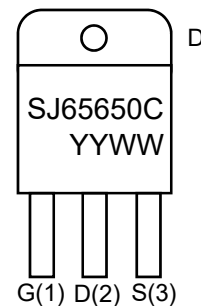
- PWM applications
- Load Switch
- Power Management
- DC-DC Converters



**TO-220  
Bottom View**



**Circuit Diagram**



**Marking (Top View)**

## Absolute maximum rating@25°C

Rating		Symbol	Value	Units
Drain-Source Voltage		$V_{DS}$	650	V
Gate-Source Voltage		$V_{GS}$	±30	V
Drain Current-Continuous <sup>1)</sup>	$T_C=25^\circ C$	$I_D$	7.0	A
	$T_C=100^\circ C$		5.3	
Pulsed Drain Current <sup>2)</sup>		$I_{DM}$	10	A
Total Power Dissipation <sup>3)</sup>		$P_D$	80.6	W
Avalanche Current <sup>4)</sup>		$I_{AS}$	4.5	A
Avalanche Energy <sup>4)</sup>		$E_{AS}$	199.5	mJ
Thermal Resistance , Junction-to-Case <sup>5)</sup>		$R_{\theta JC}$	1.5	°C/W
Thermal Resistance , Junction-to-Ambient <sup>6)</sup>		$R_{\theta JA}$	47.5	°C/W
Junction and Storage Temperature Range		$T_J, T_{STG}$	-55~+150	°C

## Electrical characteristics per line@25°C (unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	650	696.7	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 650V, V_{GS} = 0V$	-	-	1.0	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS} = \pm 30V, V_{DS} = 0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.5	2.77	3.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D = 1A$	-	519	650	m $\Omega$
<b>Dynamic Characteristics<sup>7)</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = 100V, V_{GS} = 0V,$ $f = 1.0MHz$	-	334.3	-	pF
Output Capacitance	$C_{oss}$		-	16.2	-	
Reverse Transfer Capacitance	$C_{rss}$		-	0.9	-	
<b>Switching Characteristics<sup>7)</sup></b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS} = 400V, V_{GS} = 10V,$ $I_D = 1A, R_G = 10\Omega$	-	26.4	-	ns
Turn-on Rise Time	$t_r$		-	11.4	-	
Turn-Off Delay Time	$t_{d(off)}$		-	132.1	-	
Turn-Off Fall Time	$t_f$		-	38.1	-	
Total Gate Charge	$Q_g$	$V_{DS} = 480V, V_{GS} = 10V,$ $I_D = 1A$	-	6.1	-	nC
Gate-Source Charge	$Q_{gs}$		-	1.4	-	
Gate-Drain Charge	$Q_{gd}$		-	2.5	-	
Gate Resistance	$R_g$	$f=1MHz$ , Open Drain	-	106.8	-	$\Omega$
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0V, I_S = 1A$	-	0.8	1.3	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F = 1A, V_R = 200V,$ $dI_F/dt = 100A/\mu s$	-	100.6	-	ns
Body Diode Reverse Recovery Charge	$Q_{rr}$		-	419.7	-	$\mu C$
Peak Reverse Recovery Current	$I_{rrm}$		-	8.4	-	A

## Notes:

1. Computed continuous current assumes the condition of  $T_{J\_Max}$  while the actual continuous current depends on the thermal & electro-mechanical application board design.
2. Repetitive Rating: Pulse width limited by maximum junction temperature( $T_{J\_Max}=150^\circ C$ ).
3. Pulse Test: Pulse Width  $\leq 10\mu s$ , Duty Cycle  $\leq 1\%$ .
4. This single-pulse measurement was taken under the following condition [ $L=20mH, V_{GS}=10V, V_{DS}=100V$ ]while it's value is limited by  $T_{J\_Max}=150^\circ C$ .
5. Device mounted on FR-4 substrate PC board, 2oz copper, with minimum recommended pad layout.
6. Device mounted on infinite heatsink.
7. Guaranteed by design, not subject to production.

Typical Characteristics

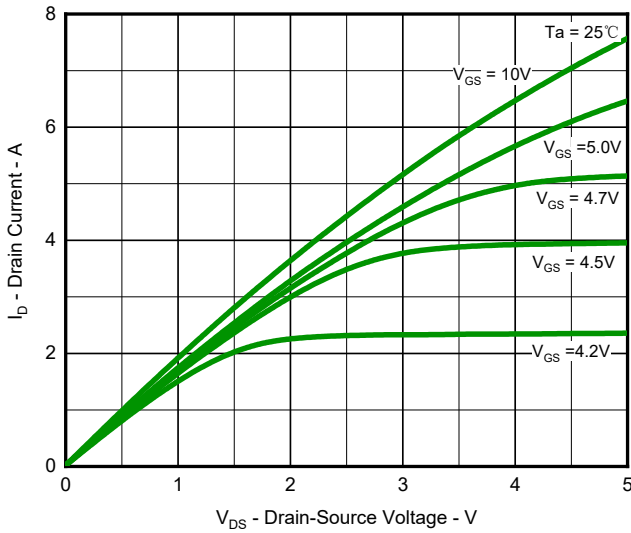


Fig.1 Output Characteristics

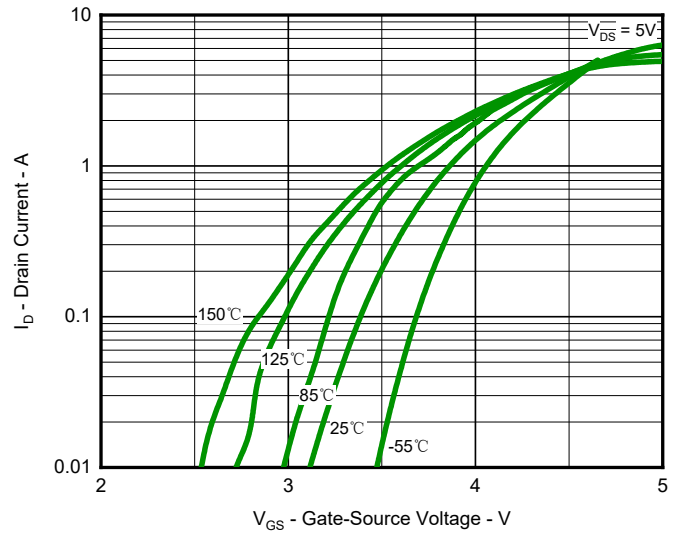


Fig.2 Typical Transfer Characteristic

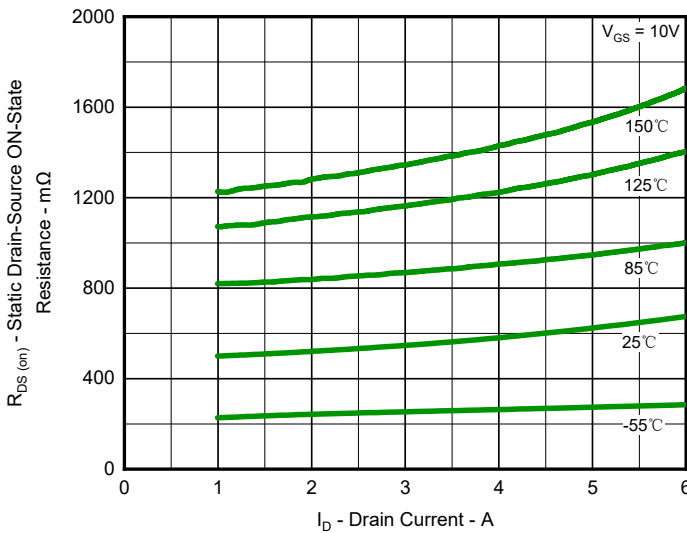


Fig.3 Typical On-Resistance vs Drain Current and Temperature

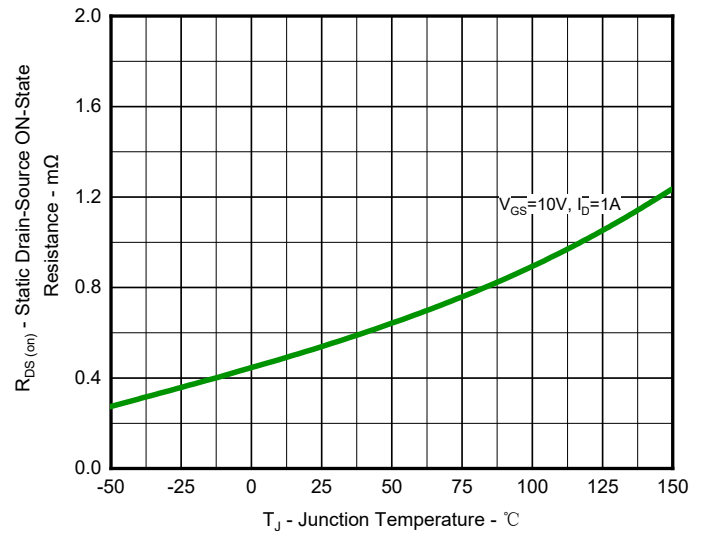


Fig.4 On-Resistance Variation with Temperature

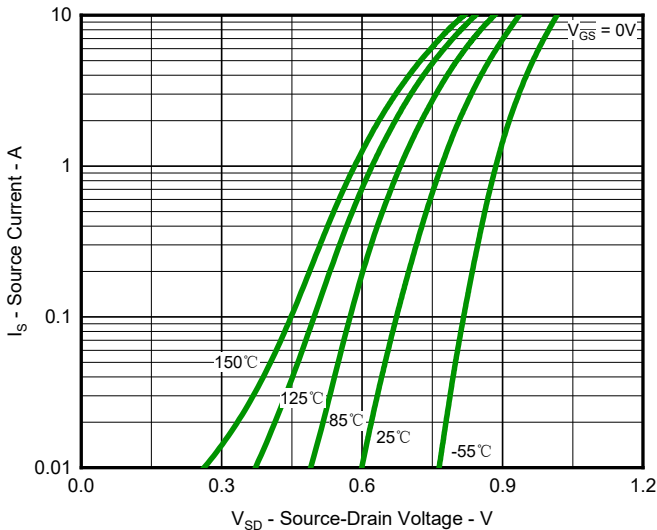


Fig.5 Diode Forward Voltage vs. Current

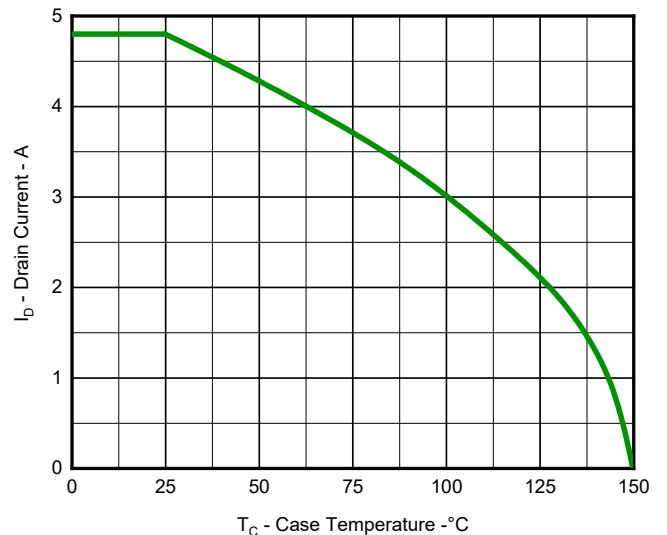
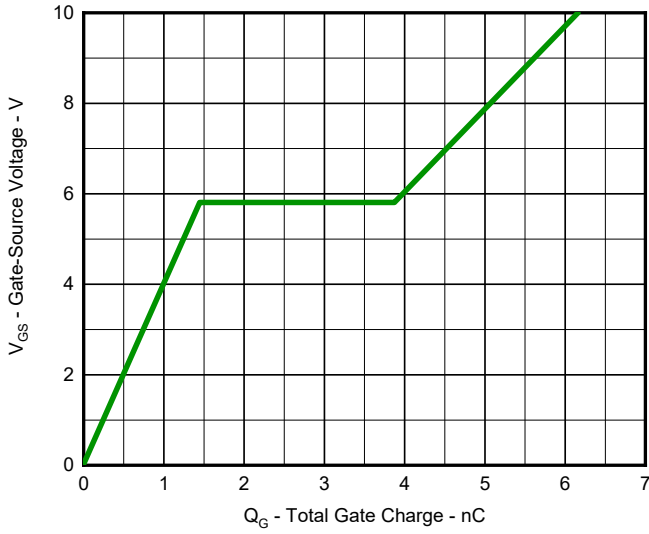
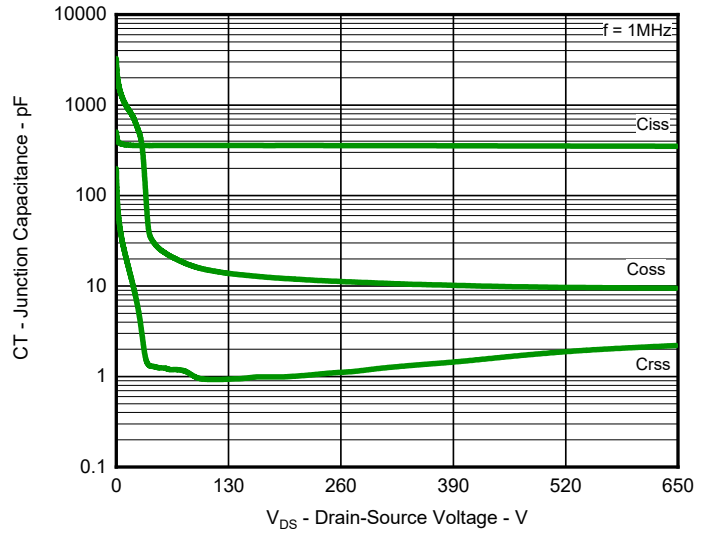


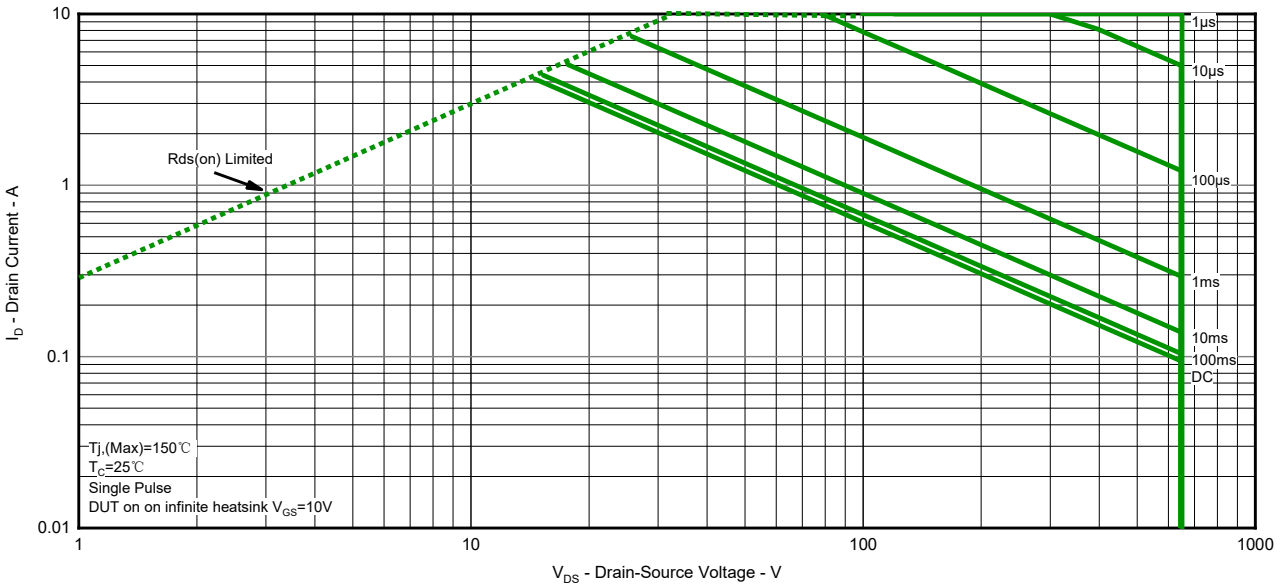
Fig.6 Maximum Drain Current vs. Case Temperature



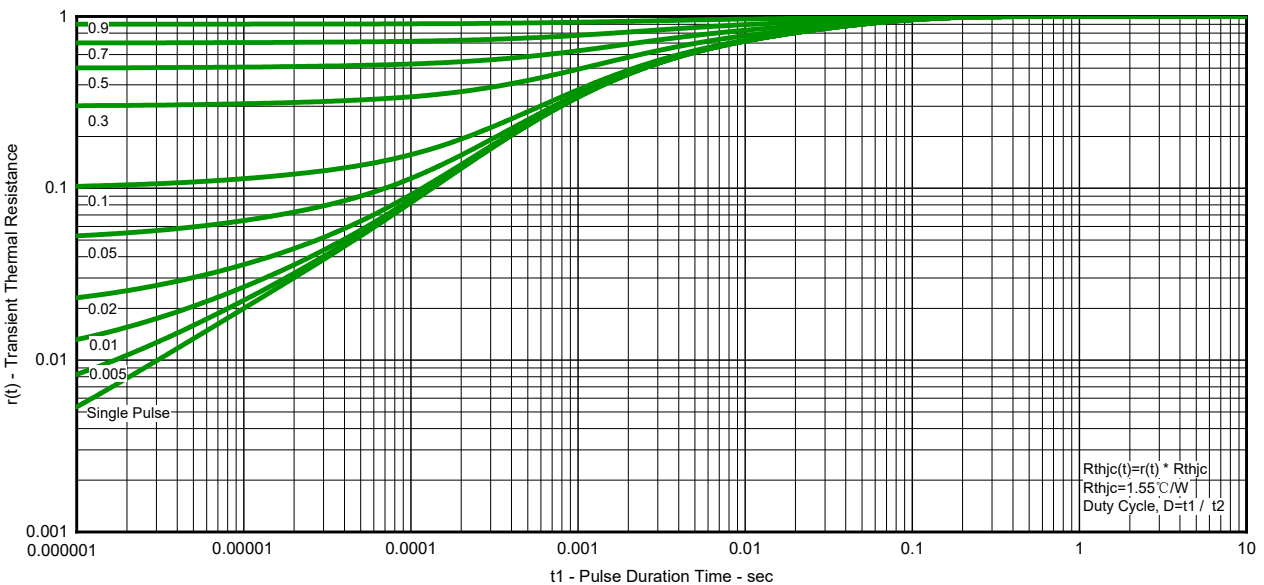
**Fig.7 Gate Charge Characteristics**



**Fig.8 Typical Junction Capacitance**

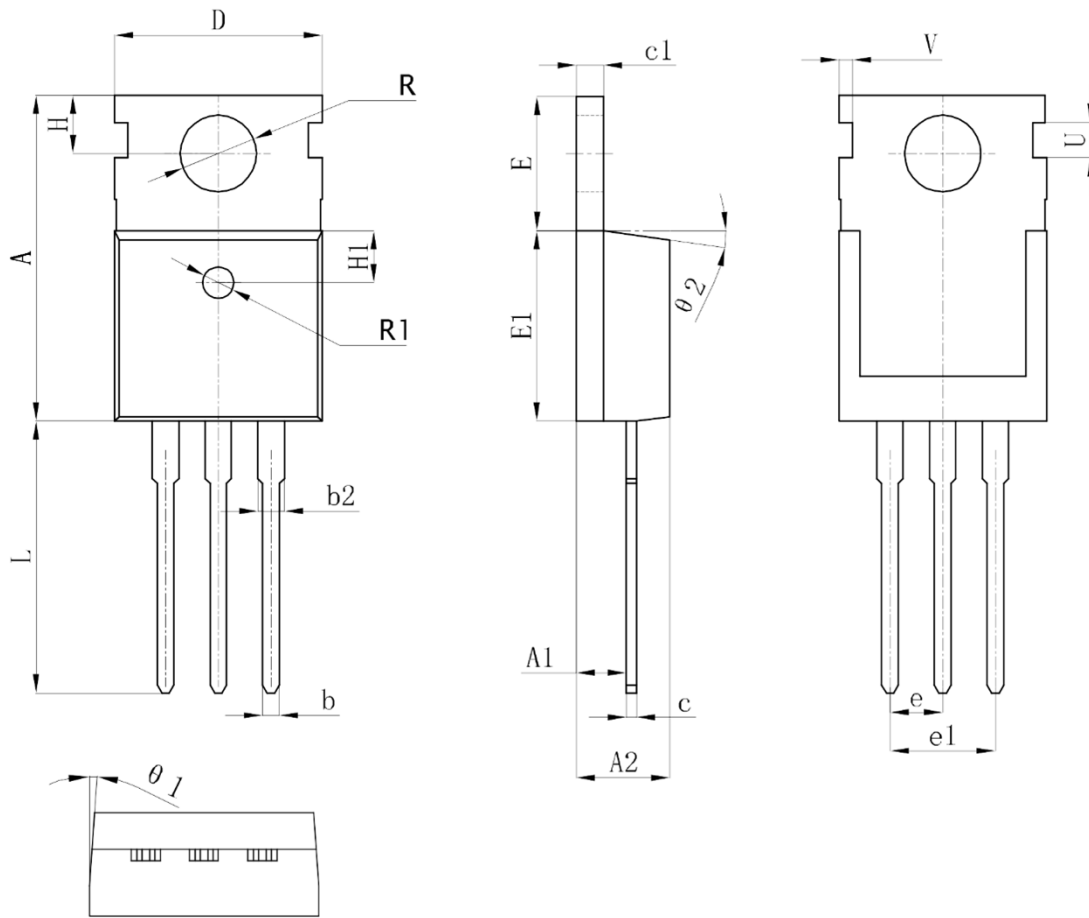


**Fig.9 Safe Operation Area**




**Fig.10 Transient Thermal Resistance**

## Product dimension (TO-220)



Dim	Millimeters		Inches		Dim	Millimeters		Inches	
	Min	Max	Min	Max		Min	Max	Min	Max
A	15.40	15.80	0.606	0.622	e1	4.84	5.32	0.191	0.209
A1	2.35	2.50	0.093	0.098	H	2.73	2.87	0.107	0.113
A2	4.40	4.70	0.173	0.185	H1	2.40	2.60	0.094	0.102
b	0.70	0.90	0.028	0.035	L	13.02	13.72	0.513	0.540
b2	1.18	1.44	0.046	0.057	R	3.50	3.63	0.138	0.143
c	0.48	0.56	0.019	0.022	R1	1.40	1.60	0.055	0.063
c1	1.29	1.32	0.051	0.052	U	1.65	1.85	0.065	0.073
D	9.80	10.20	0.386	0.402	V	0.58	0.78	0.023	0.031
E	6.40	6.60	0.252	0.260	θ1	2°	3°	2°	3°
E1	9.00	9.20	0.354	0.362	θ2	6.5°	7.5°	6.5°	7.5°
e	2.42	2.66	0.095	0.105					


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