

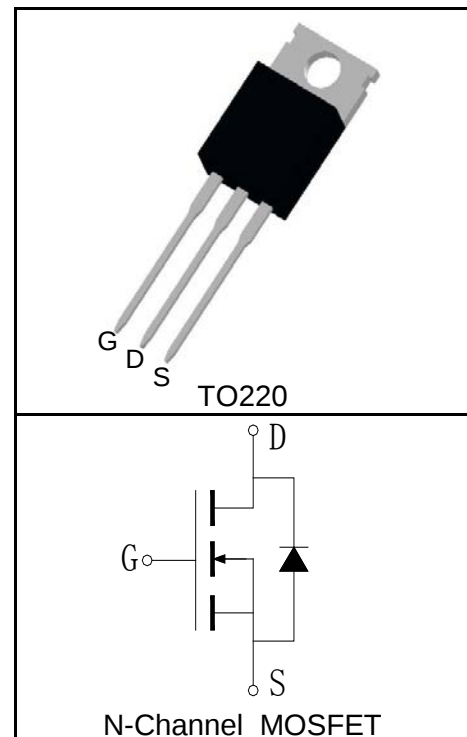
Features

- 500V/13A,
 $R_{DS(ON)} = 420m\Omega(Typ.)@V_{GS}=10V$
- Super High Dense Cell Design
- Fast Switching
- 100% avalanche tested
- Lead Free and Green Devices Available (RoHS Compliant)

Applications

- High efficiency switch mode power supplies
- Lighting

Pin Description



Absolute Maximum Ratings

Symbol	Parameter		Rating	Unit
Common Ratings (T _C =25°C Unless Otherwise Noted)				
V _{DSS}	Drain-Source Voltage		500	V
V _{GSS}	Gate-Source Voltage		±30	
T _J	Maximum Junction Temperature		150	°C
T _{STG}	Storage Temperature Range		-55 to 150	°C
I _S	Diode Continuous Forward Current	T _C =25°C	13	A
Mounted on Large Heat Sink				
I _{DP} ^①	300μs Pulse Drain Current Tested	T _C =25°C	52	A
I _D ^②	Continuous Drain Current(V _{GS} =10V)	T _C =25°C	13	A
		T _C =100°C	8.2	
P _D	Maximum Power Dissipation	T _C =25°C	208	W
		T _C =100°C	83	
R _{θJC}	Thermal Resistance-Junction to Case		0.6	°C/W
R _{θJA}	Thermal Resistance-Junction to Ambient		62.5	°C/W
Drain-Source Avalanche Ratings				
E _{AS} ^③	Avalanche Energy, Single Pulsed		500	mJ

Electrical Characteristics ($T_C=25^{\circ}\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Test Condition	RU5H13R			Unit
			Min.	Typ.	Max.	
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _{DS} =250μA	500			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =500V, V _{GS} =0V			1	μA
			T _J =125°C		30	
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _{DS} =250μA	2		4	V
I _{GSS}	Gate Leakage Current	V _{GS} =±30V, V _{DS} =0V			±100	nA
R _{DS(ON)} ^④	Drain-Source On-state Resistance	V _{GS} =10V, I _{DS} =6.5A		420	480	mΩ
Diode Characteristics						
V _{SD} ^④	Diode Forward Voltage	I _{SD} =13A, V _{GS} =0V			1.3	V
t _{rr}	Reverse Recovery Time	I _{SD} =13A, dI _{SD} /dt=100A/μs		460		ns
Q _{rr}	Reverse Recovery Charge			4.6		μC
Dynamic Characteristics ^⑤						
R _G	Gate Resistance	V _{GS} =0V, V _{DS} =0V, F=1MHz		5		Ω
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =250V, Frequency=1.0MHz		1900		pF
C _{oss}	Output Capacitance			220		
C _{rss}	Reverse Transfer Capacitance			25		
t _{d(ON)}	Turn-on Delay Time	V _{DD} =250V, R _L =20Ω, I _{DS} =13A, V _{GEN} =10V, R _G =25Ω		25		ns
t _r	Turn-on Rise Time			45		
t _{d(OFF)}	Turn-off Delay Time			35		
t _f	Turn-off Fall Time			65		
Gate Charge Characteristics ^⑤						
Q _g	Total Gate Charge	V _{DS} =400V, V _{GS} =10V, I _{DS} =13A		45		nC
Q _{gs}	Gate-Source Charge			11		
Q _{gd}	Gate-Drain Charge			18		

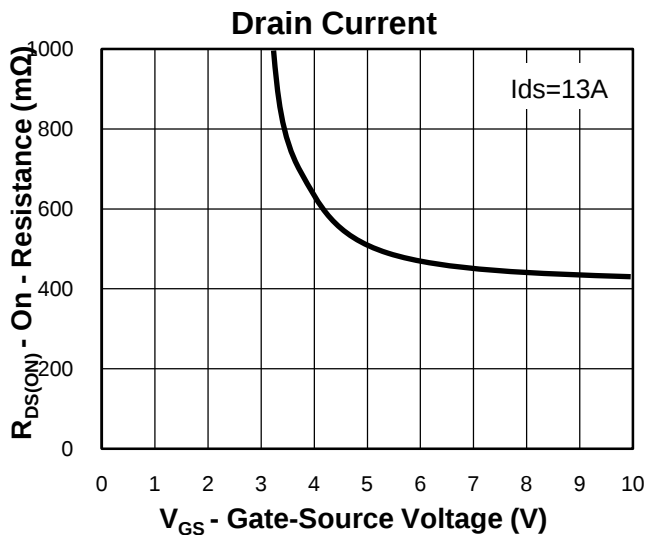
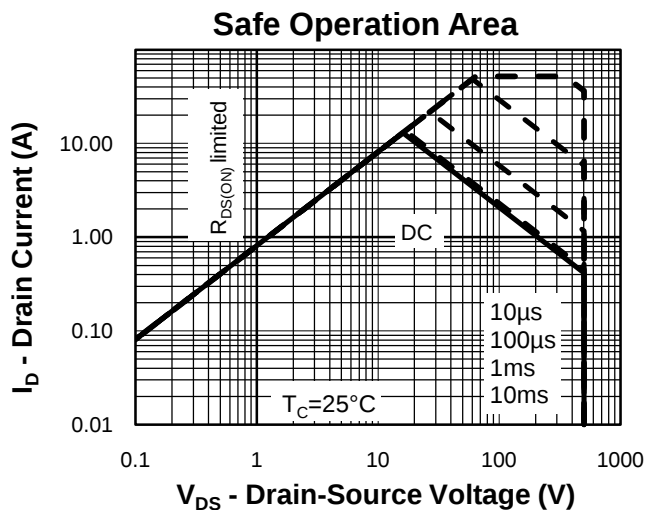
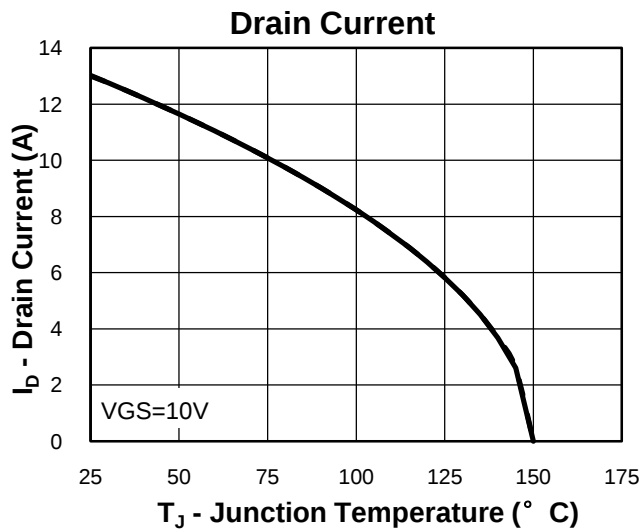
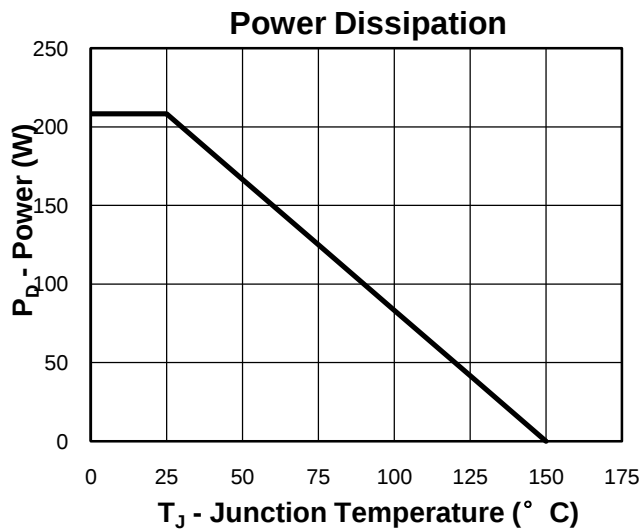
Notes:

- ① Pulse width limited by safe operating area.
- ② Calculated continuous current based on maximum allowable junction temperature.
- ③ Limited by T_{Jmax} , $I_{AS}=10A$, $V_{DD}=100V$, $R_G=50\Omega$, Starting $T_J=25^{\circ}\text{C}$.
- ④ Pulse test; Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- ⑤ Guaranteed by design, not subject to production testing.

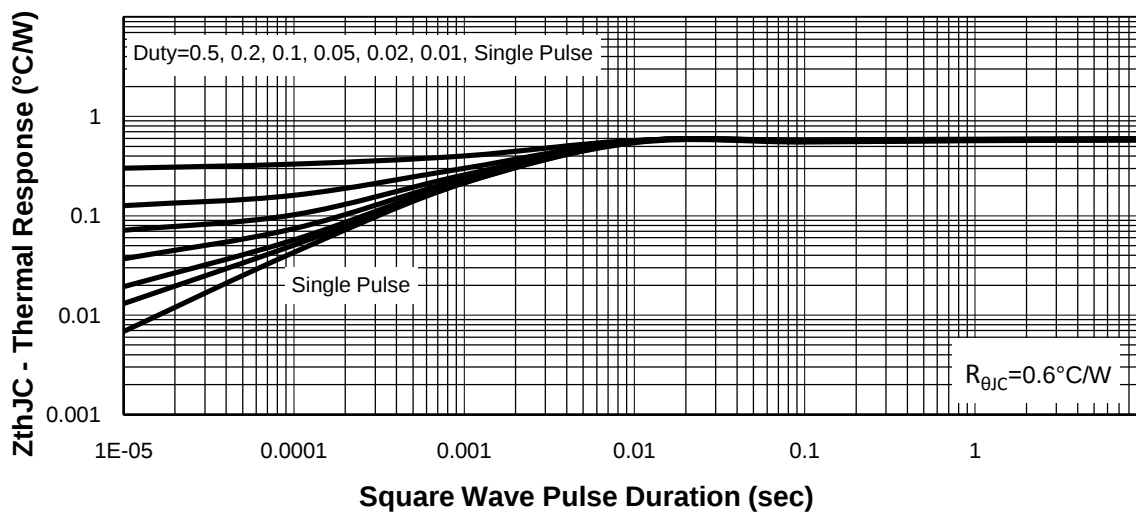
Ordering and Marking Information

Device	Marking	Package	Packaging	Quantity	Reel Size	Tape width
RU5H13R	RU5H13R	TO220	Tube	50	-	-

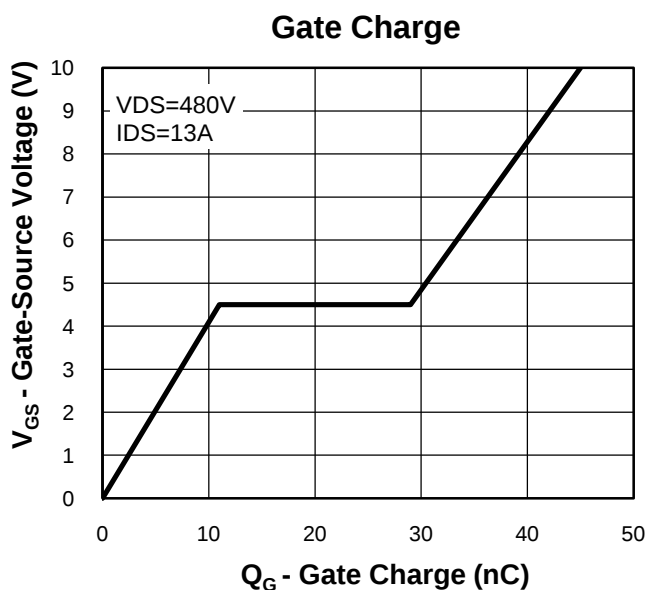
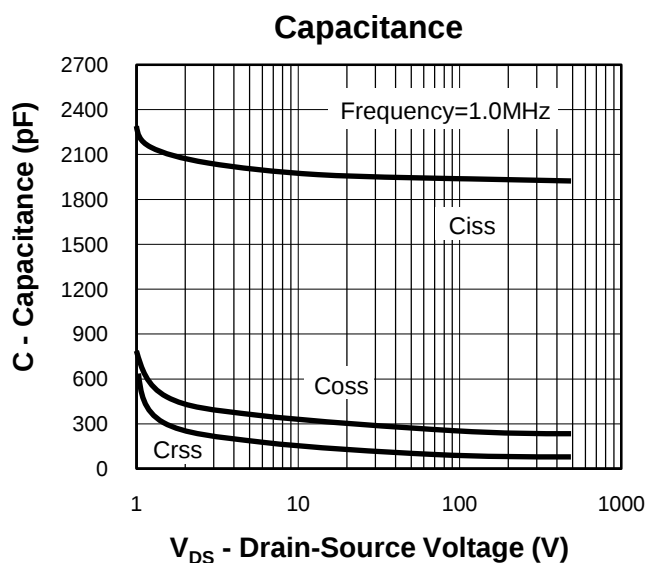
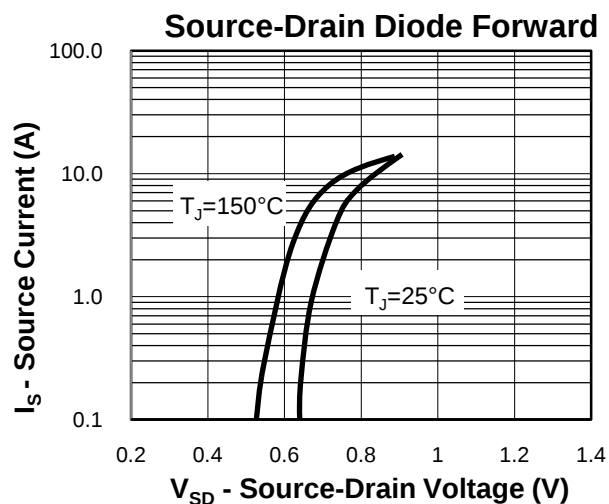
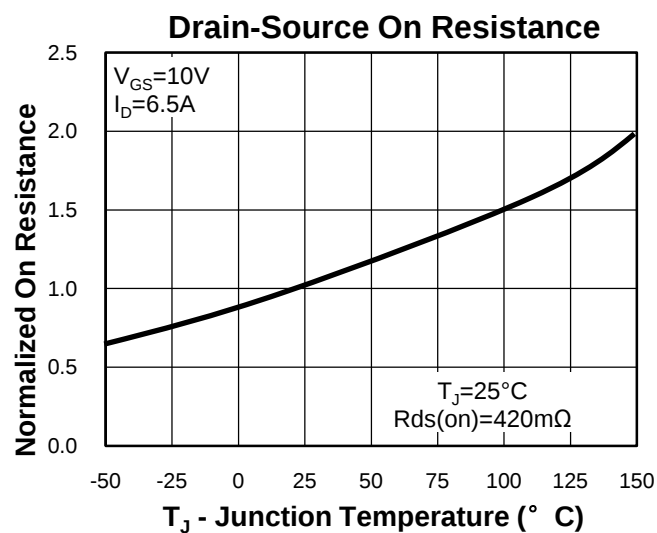
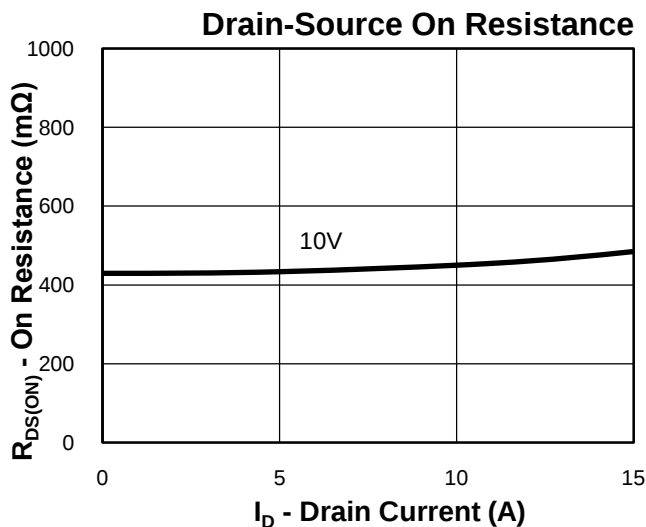
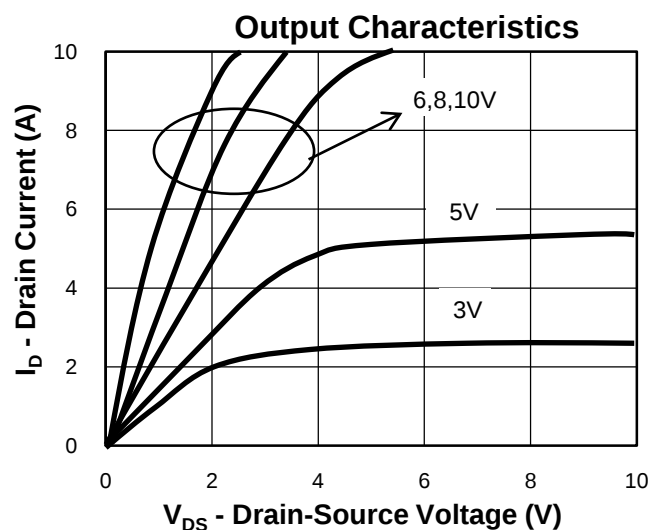
Typical Characteristics



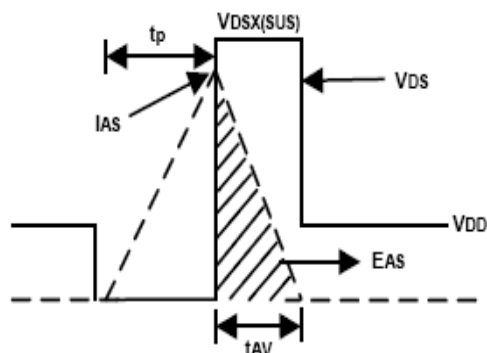
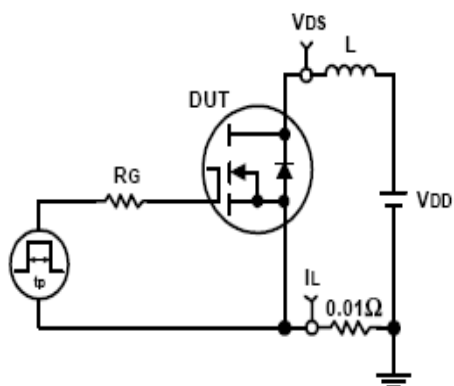
Thermal Transient Impedance



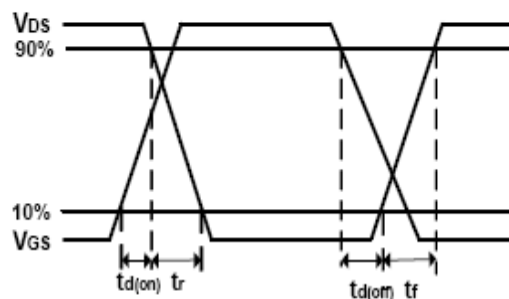
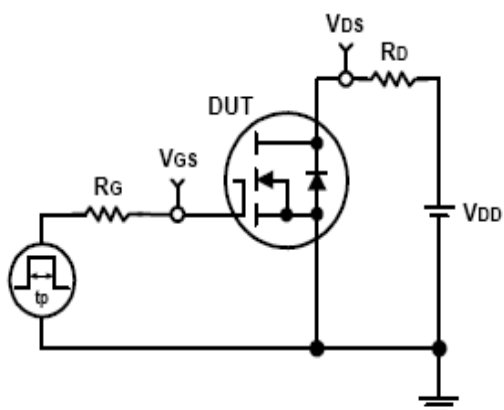
Typical Characteristics



Avalanche Test Circuit and Waveforms

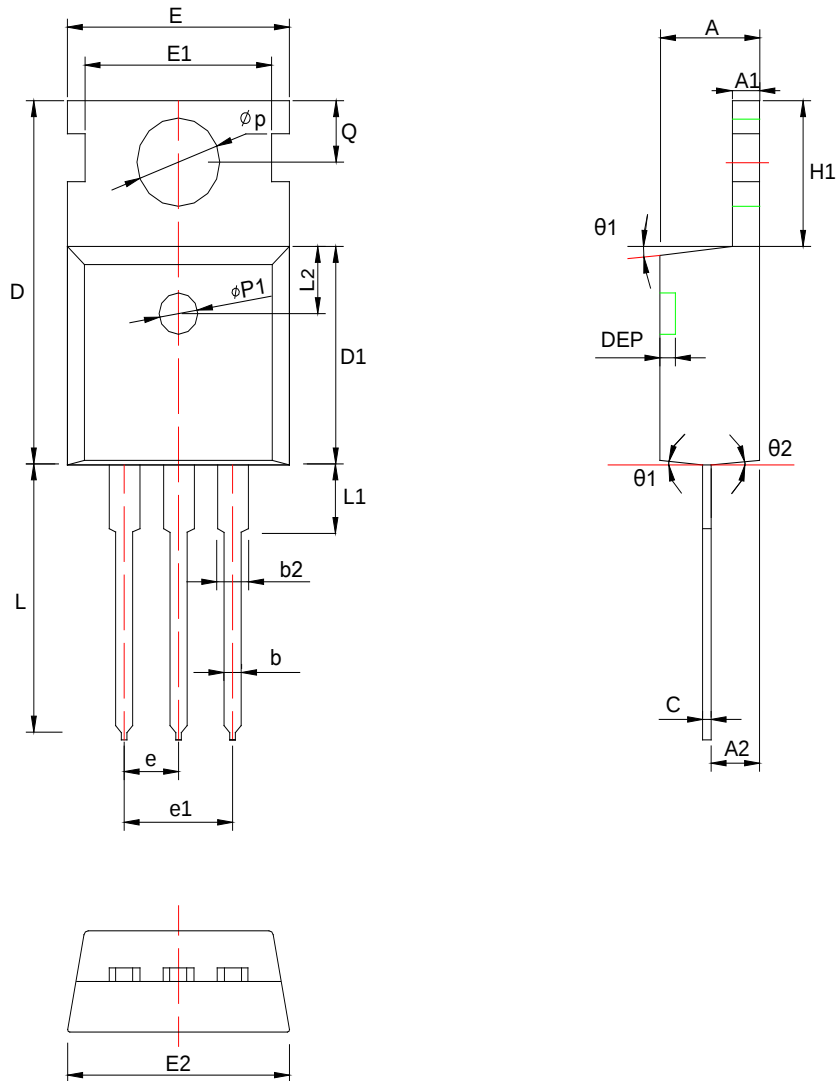


Switching Time Test Circuit and Waveforms



Package Information

TO220



SYMBOL	MM			INCH			SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX		MIN	NOM	MAX	MIN	NOM	MAX
A	4.40	4.55	4.70	0.173	0.179	0.185	$\Phi p1$	1.40	1.50	1.60	0.055	0.059	0.063
A1	1.20	1.30	1.40	0.047	0.051	0.055	e	2.54 BSC			0.10 BSC		
A2	2.23	2.38	2.53	0.088	0.094	0.100	e1	5.08 BSC			0.20 BSC		
b	0.75	0.80	0.85	0.030	0.031	0.033	H1	6.40	6.50	6.60	0.252	0.256	0.260
b2	1.17	1.28	1.39	0.046	0.050	0.055	L	12.70	13.18	13.65	0.500	0.519	0.537
c	0.40	0.50	0.60	0.016	0.020	0.024	L1	*	*	3.95	*	*	0.156
D	15.40	15.60	15.80	0.606	0.614	0.622	L2	2.50 REF			0.098 REF		
D1	8.96	9.21	9.46	0.353	0.363	0.372	Φp	3.50	3.60	3.70	0.138	0.142	0.146
DEP	0.05	0.13	0.20	0.002	0.005	0.008	Q	2.73	2.80	2.87	0.107	0.110	0.113
E	9.66	9.97	10.28	0.380	0.393	0.405	$\theta 1$	5°	7°	9°	5°	7°	9°
E1	*	8.70	*	*	0.343	*	$\theta 2$	1°	3°	5°	1°	3°	5°
E2	9.80	10.00	10.20	0.386	0.394	0.402							

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