



### Features

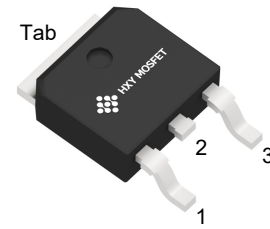
- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low  $R_{DS(on)}$
- Easy to parallel
- Simple to drive
- RoHS Compliant

### Benefits

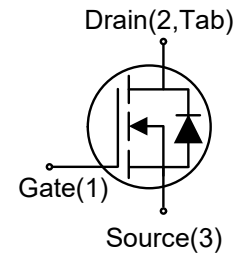
- Increased Power Density
- Faster Operating Frequency
- Reduction of Heat Sink Requirements
- Higher Efficiency
- Reduced EMI

### Applications

- Power Factor Correction Modules
- Switch Mode Power Supplies
- DC-AC Inverters
- High Voltage DC/DC Converters



TO-252-2L



Ordering Part Number	Package	Brand
HCD65R320	TO-252-2L	HXY MOSFET

### Maximum Ratings ( $T_c = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions
$V_{DSmax}$	Drain - Source Voltage	650	V	$V_{GS} = 0\text{ V}, I_D = 100\ \mu\text{A}$
$V_{GSmax}$	Gate - Source Voltage (dynamic)	-5/+26	V	AC ( $f > 1\text{ Hz}$ )
$V_{GSop}$	Gate - Source Voltage (static)	0/+18	V	Static
$I_D$	Continuous Drain Current	15	A	$T_C = 25^\circ\text{C}$
		12		$T_C = 100^\circ\text{C}$
$I_{DM}$	Pulsed Drain Current	39	A	Pulse width $t_p$ limited by $T_{Jmax}$
$P_D$	Power Dissipation	52	W	$T_C = 25^\circ\text{C}$
		25		$T_C = 100^\circ\text{C}$
$T_J, T_{stg}$	Operating Junction and Storage Temperature	-55 to +175	$^\circ\text{C}$	



**Electrical Characteristics** ( $T_c = 25^\circ\text{C}$  unless other wise specified)

**Static Characteristics**

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$I_D=1\text{ mA}, V_{GS}=0\text{V}$	650			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=650\text{V}, V_{GS}=0\text{V}$		1	15	$\mu\text{A}$
$I_{GSS}$	Gate-Source Leakage Current	$V_{DS}=0\text{V}, V_{GS}=18\text{V}$			50	$\mu\text{A}$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=1\text{mA}$ $T_j=25^\circ\text{C}$ $T_j=175^\circ\text{C}$		3.5 2.8	4	V
$R_{DS(on)}$	Drain-Source On-State Resistance	$V_{GS}=18\text{V}, I_D=4.5\text{A}$ $T_j=25^\circ\text{C}$ $T_j=175^\circ\text{C}$		180 205	220	m $\Omega$
	Drain-Source On-State Resistance	$V_{GS}=15\text{V}, I_D=4.5\text{A}$ $T_j=25^\circ\text{C}$ $T_j=175^\circ\text{C}$		260 295	300	nA
$C_{iss}$	Input Capacitance			180		pF
$C_{oss}$	Output Capacitance	$V_{DS}=400\text{V}, f=1\text{MHz},$ $V_{GS}=0\text{V}$		20		pF
$C_{rss}$	Reverse Transfer Capacitance			0.9		pF
$Q_g$	Total Gate Charge	$V_{DS}=400\text{V}, I_D=5\text{A},$ $R_G = 10\ \Omega$ $V_{GS} = 0/15\text{V}$		11.2		nC
$Q_{gs}$	Gate to Source Charge			2.3		nC
$Q_{gd}$	Gate to Drain Charge			1.1		nC
$t_{d(on)}$	Turn-On Delay Time			5		ns
$t_r$	Rise Time			17		ns
$t_{d(off)}$	Turn-Off Delay Time	$V_{DD}=400\text{V}, I_D=5\text{A},$ $V_{GS}=-5/18\text{V},$ $R_G=10\ \Omega,$		8		ns
$t_f$	Fall Time			10		ns
$E_{on}$	Turn-On Energy			25		$\mu\text{J}$
$E_{off}$	Turn-Off Energy			10		$\mu\text{J}$



### Reverse Diode Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{SD}$	Diode Forward Voltage	$V_{GS}=-4V, I_{SD}=2.5A$ $T_j=25^{\circ}C$ $T_j=175^{\circ}C$		4.0 3.6		V
$I_S$	Continuous Diode Forward Current	$T_c=25^{\circ}C$ $T_c=100^{\circ}C$		15 12		A
$t_{rr}$	Reverse Recovery Time	$I_{SD}=-5A$ $V_{GS}=-5V, I_{SD}=4.5A,$		50		ns
$Q_{rr}$	Reverse Recovery Charge	$V_R=400V,$ $di/dt=1000A/\mu s$		38		nC
$I_{rrm}$	Peak Reverse Recovery Current			2.4		A

### Thermal Characteristics

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
$R_{th(j-c)}$	Thermal Resistance from Junction to Case		2.88		$^{\circ}C/W$
$R_{th(j-a)}$	Thermal Resistance from Junction to Ambient		40		$^{\circ}C/W$



### Typical Performance

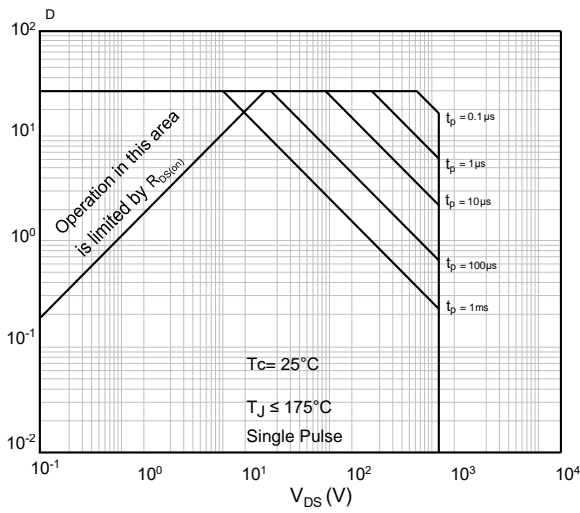


Figure 1. Safe Operating Area

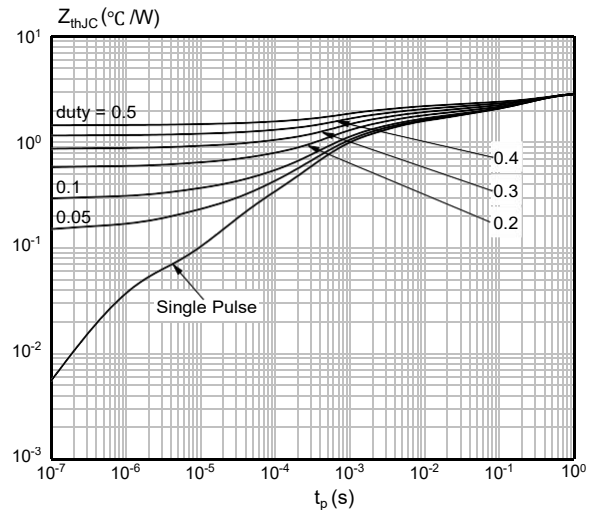


Figure 2. Maximum Transient Thermal Impedance

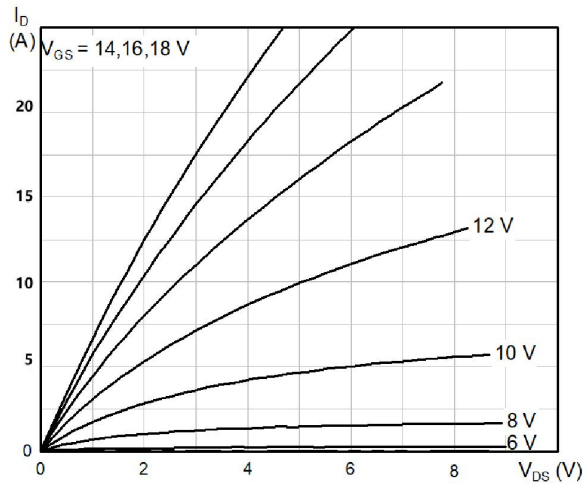


Figure 3. Typical Output Characteristics,  $T_J = 25^\circ\text{C}$

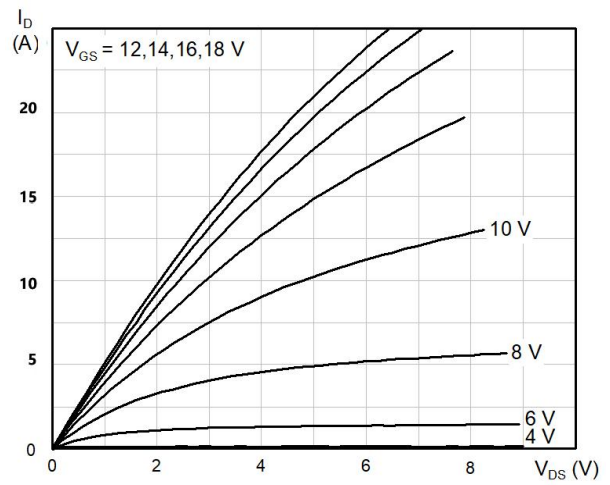


Figure 4. Typical Output Characteristics,  $T_J = 175^\circ\text{C}$

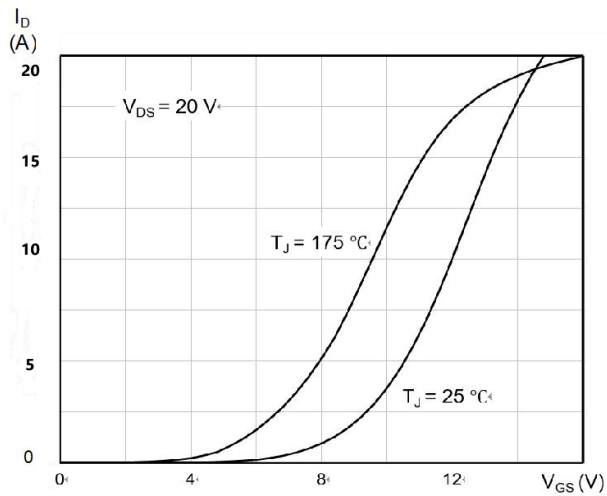


Figure 5. Typical Transfer Characteristics

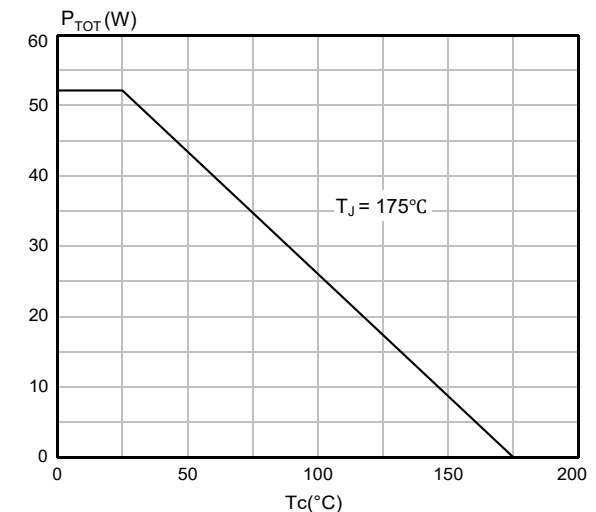


Figure 6. Total Power Dissipation

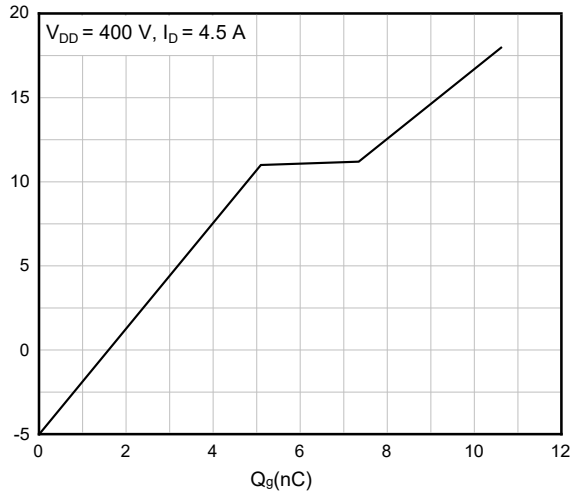


Figure 7. Typical Gate Charge Characteristics

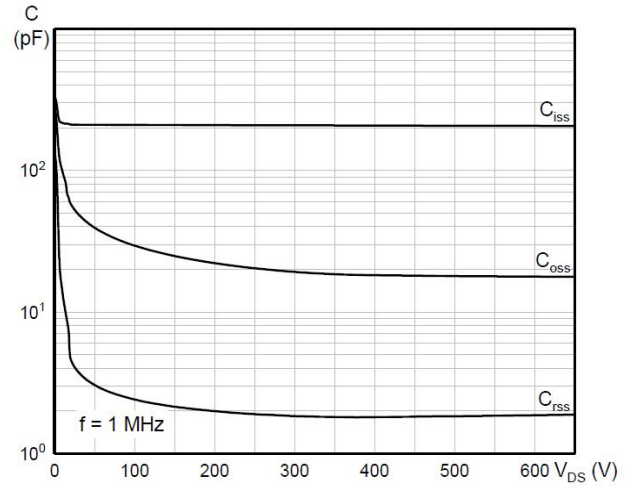


Figure 8. Typical Capacitance Characteristics

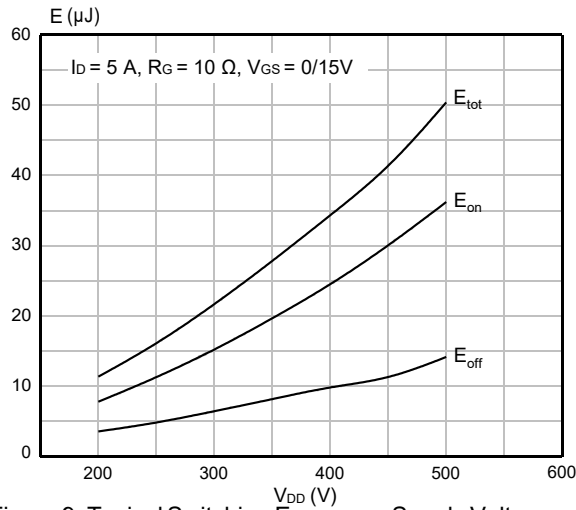


Figure 9. Typical Switching Energy vs. Supply Voltage

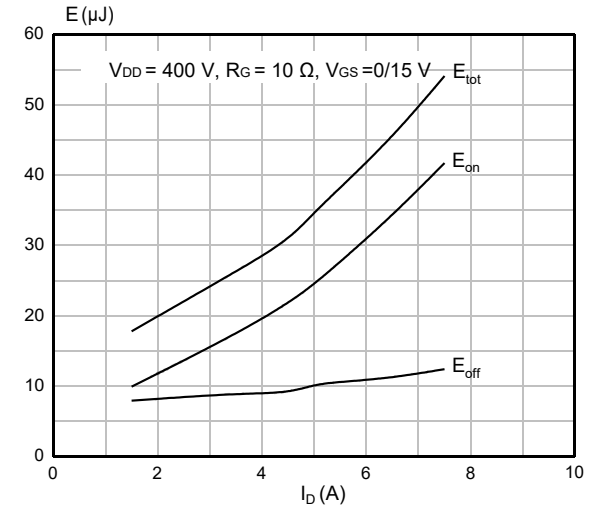


Figure 10. Typical Switching Energy vs. Drain Current

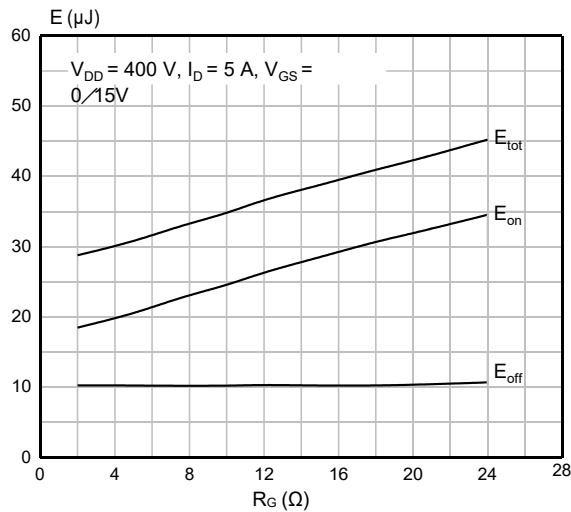


Figure 11. Switching Energy vs. Gate Resistance

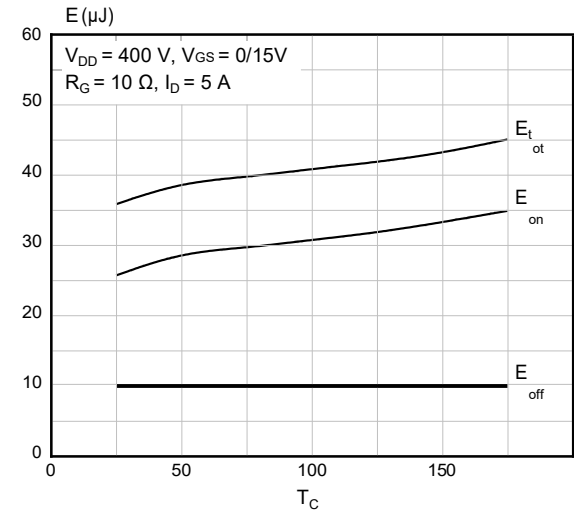


Figure 12. Typical Switching Energy vs. Temperature

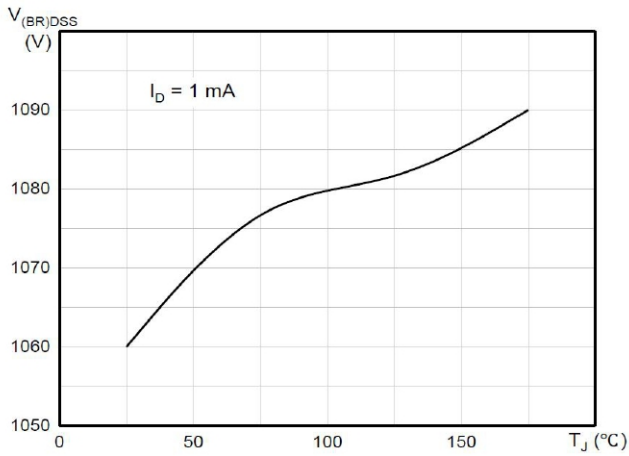


Figure 13. Breakdown Voltage vs. Temperature

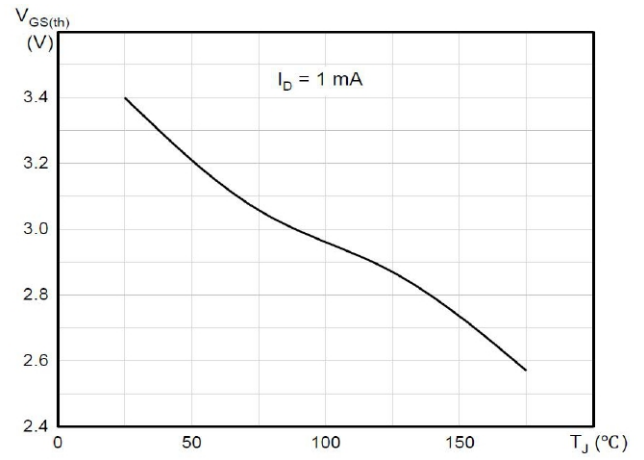


Figure 14. Gate Threshold vs. Temperature

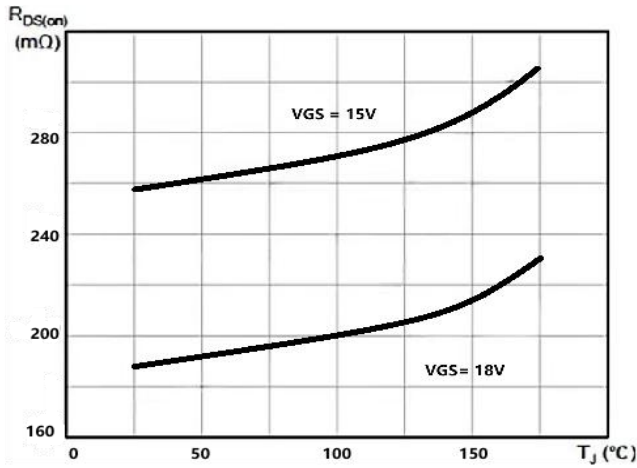


Figure 15. On-Resistance vs. Temperature

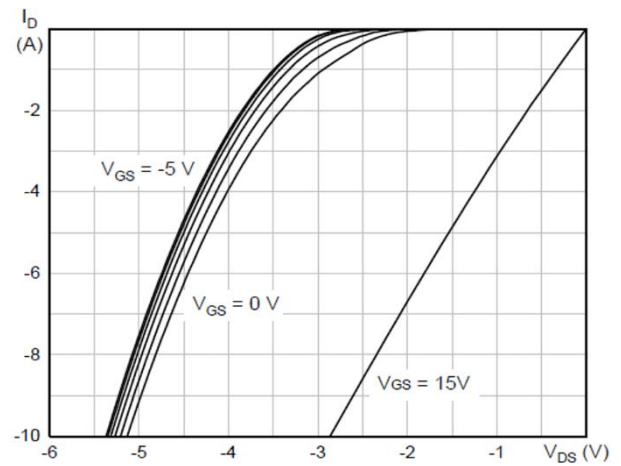


Figure 16. Body Diode Characteristics, T<sub>J</sub> = 25°C

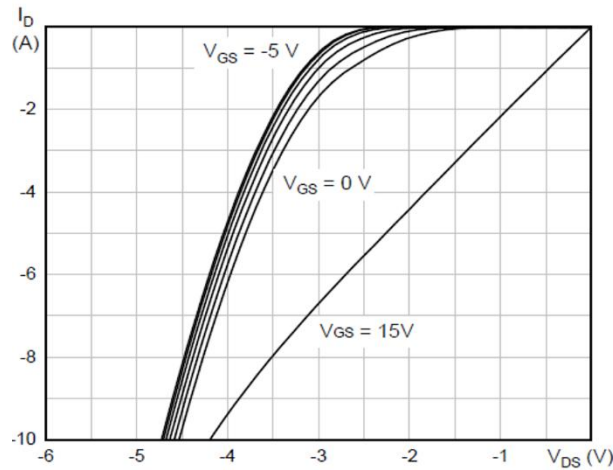
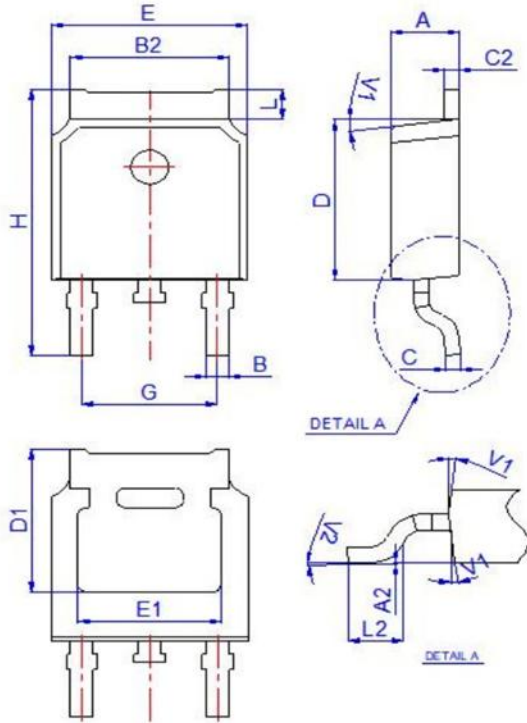


Figure 17. Body Diode Characteristics, T<sub>J</sub> = 175°C



## Package Dimensions

Package TO-252-2L



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2		0°	6°		0°	6°



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