

## 60V 50A N-Channel Enhancement Mode Power MOSFET

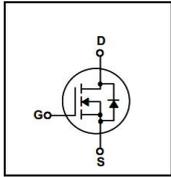
### Features

- $R_{DS(on)} \leq 17m\Omega$  @  $V_{gs}=10V, I_d=30A$
- Advanced trench technology
- Excellent  $R_{DS(on)}$  and Low Gate Charge
- Lead free product is acquired

### Application

- Load Switch
- PWM Application
- Power management

### SYMBOL



TO-252

### ASSEMBLY MESSAGE

Product Name	Package	Packaging
BXT170N06D	TO-252	Reel

### ABSOLUTE MAXIMUM RATINGS ( $T_C=25^\circ C$ unless otherwise noted)

Parameter		Symbol	Rating	Unit
			TO-252	
Drain-Source Voltage		$V_{DSS}$	60	V
Drain Current	Continuous ( $T_C = 25^\circ C$ )	$I_D$	50	A
	Continuous ( $T_C = 100^\circ C$ )		33	A
Drain Current	Pulsed (Note1)	$I_{DM}$	200	A
Single Pulsed Avalanche Energy		EAS	112	mJ
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Power Dissipation	$T_C = 25^\circ C$	$P_D$	94	W
Maximum Junction Temperature		$T_J$	175	$^\circ C$
Storage Temperature Range		$T_{STG}$	-55 to 175	$^\circ C$

Note: 1. Repetitive Rating: Pulse width limited by maximum junction temperature

### THERMAL CHARACTERISTICS

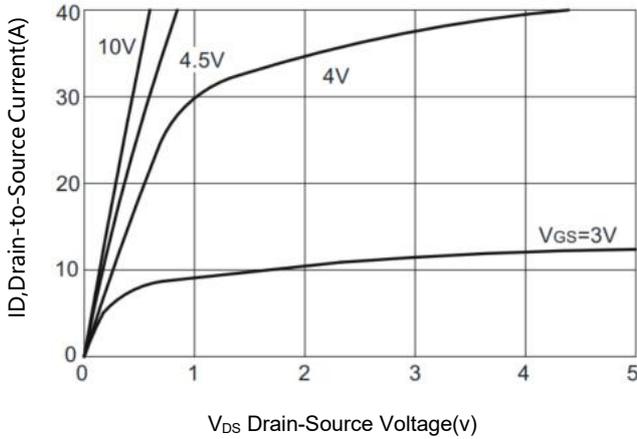
Parameter	Symbol	Max.	Unit
		TO-252	
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.6	$^\circ C / W$

**ELECTRICAL CHARACTERISTICS** ( $T_J=25^{\circ}\text{C}$ , unless otherwise Noted)

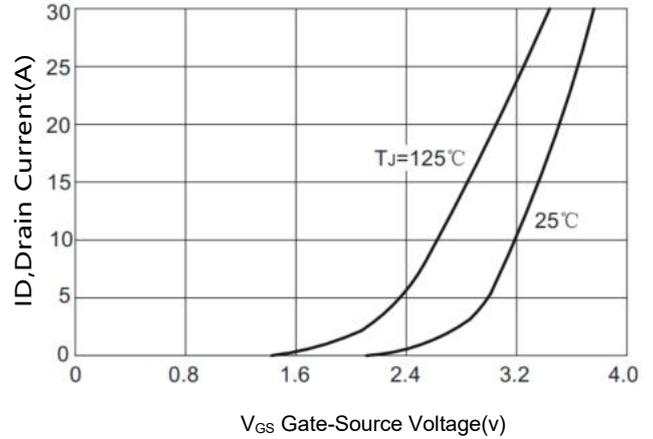
Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	60			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=60V, V_{GS}=0V$			1	$\mu A$
Gate-Body Leakage Current, Forward	$I_{GSS}$	$V_{GS}=20V$			100	nA
Gate-Body Leakage Current, Reverse		$V_{GS}=-20V$			-100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.6	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=30A$		12	17	$m\Omega$
		$V_{GS}=4.5V, I_D=20A$		16	25	$m\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0MHz$		1980		$\mu F$
Output Capacitance	$C_{OSS}$			175		$\mu F$
Reverse Transfer Capacitance	$C_{RSS}$			150		$\mu F$
<b>SWITCHING PARAMETERS</b>						
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=30V, I_D=30A, V_{GS} =$ $10V, R_G=1.8\Omega$		7.3		ns
Turn-ON Rise Time	$t_R$			5		ns
Turn-OFF Delay Time	$t_{D(OFF)}$			28		ns
Turn-OFF Fall-Time	$t_F$			6		ns
Total Gate Charge(Note2)	$Q_G$	$V_{DS} =30V, V_{GS} =10V, I_D$ $=30A$		49		nC
Gate Source Charge	$Q_{GS}$			6.1		nC
Gate Drain Charge	$Q_{GD}$			14		nC
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Drain-Source Diode Forward Voltage	$V_{SD}$	$I_S=30A, V_{GS}=0V$			1.2	V
Diode Continuous Forward Current	$I_S$				50	A
Maximum Pulsed Drain to Source Diode Forward Current	$I_{SM}$				200	A
Body Diode Reverse Recovery Time	$t_{rr}$	$I_F=30A, di/dt=100A/\mu s$		30		ns
Body Diode Reverse Recovery Charge	$Q_{rr}$			42		nC

Note: 2. Essentially independent of operating temperature

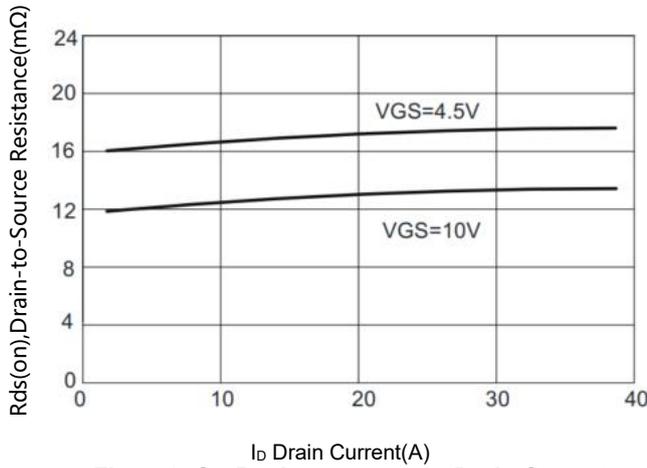
**TYPICAL CHARACTERISTICS**



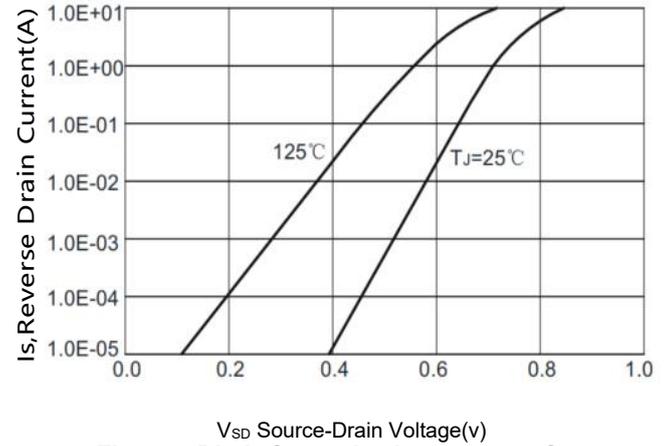
**Figure1. Typical Output Characteristics**



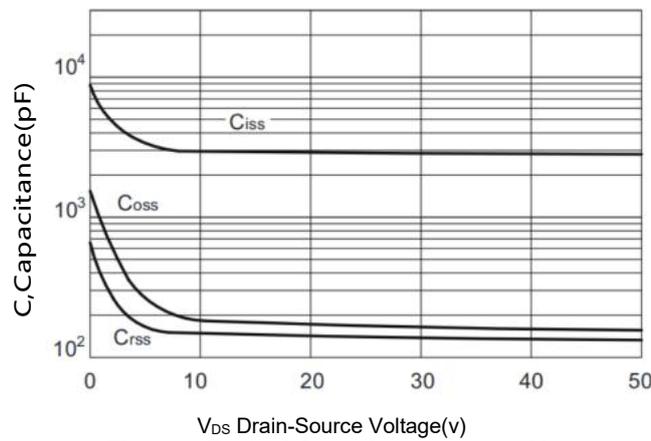
**Figure2. Typical Transfer Characteristics**



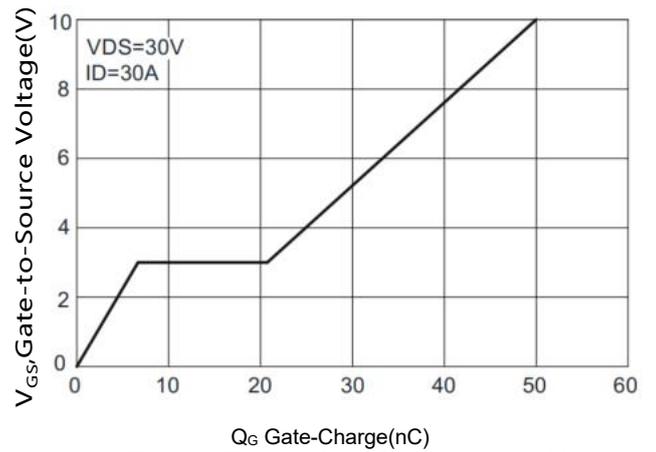
**Figure3. On-Resistance versus Drain Current**



**Figure4. Diode forward voltage versus Current**

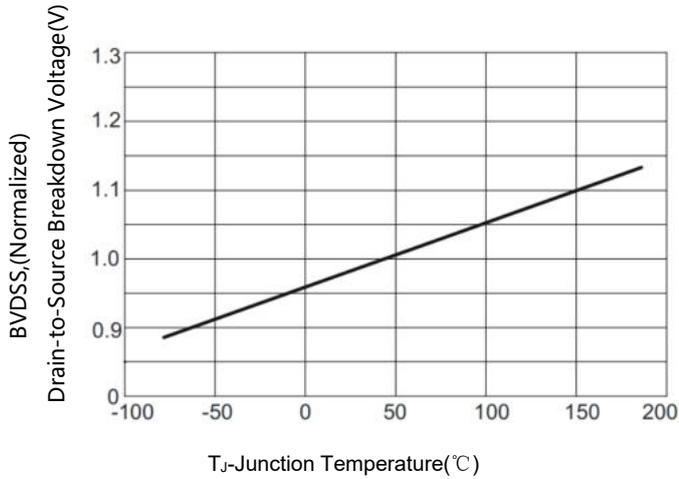


**Figure5. Typical Capacitance versus VDS**

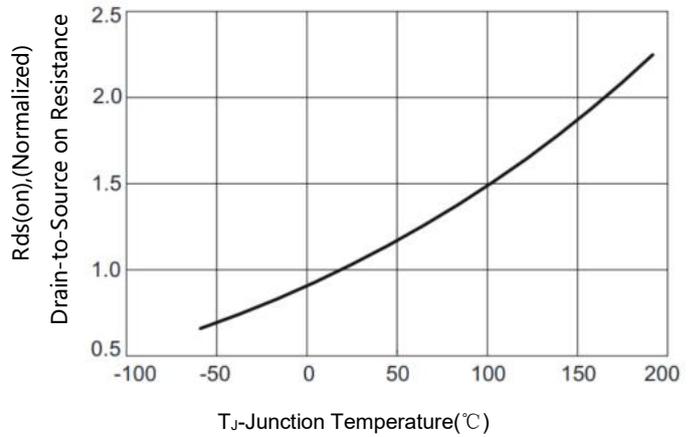


**Figure6. Typical Gate Charge versus VGS**

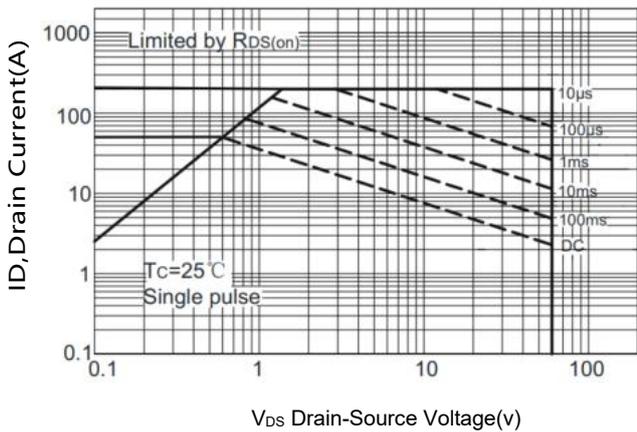
**TYPICAL CHARACTERISTICS(Cont.)**



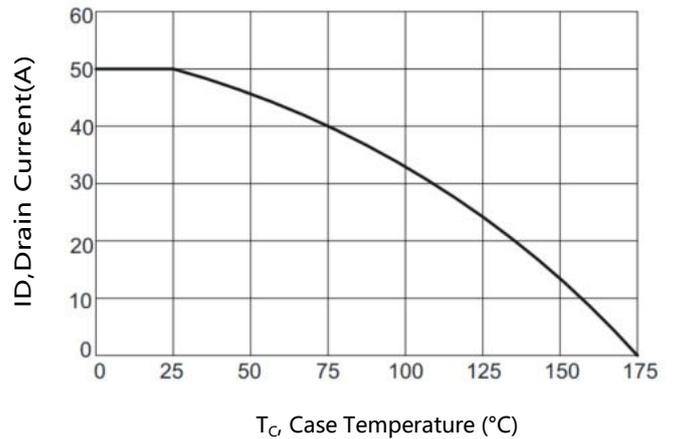
**Figure7.  $BV_{DSS}$  Variation with Temperature**



**Figure8. On-Resistance Variation with Temperature**

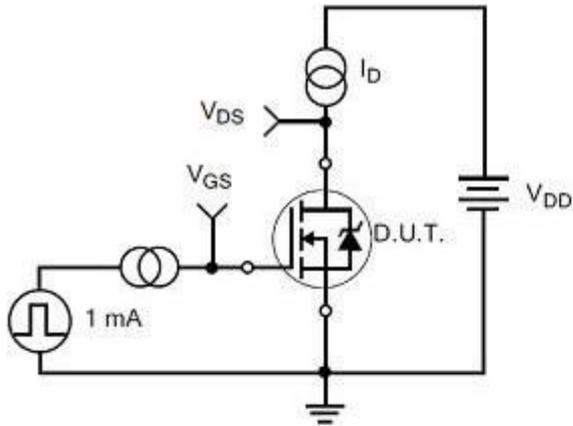


**Figure9. Maximum Safe Operating Area**

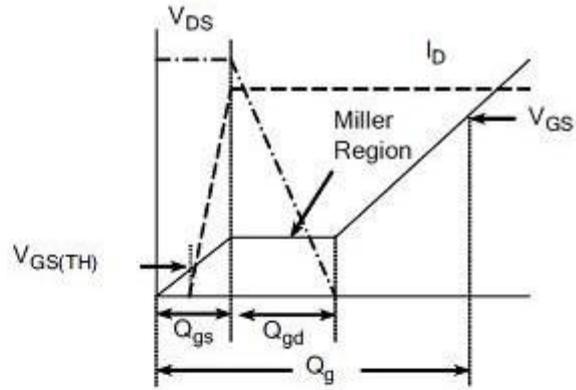


**Figure10. Maximum Continuous Drain Current versus Case Temperature**

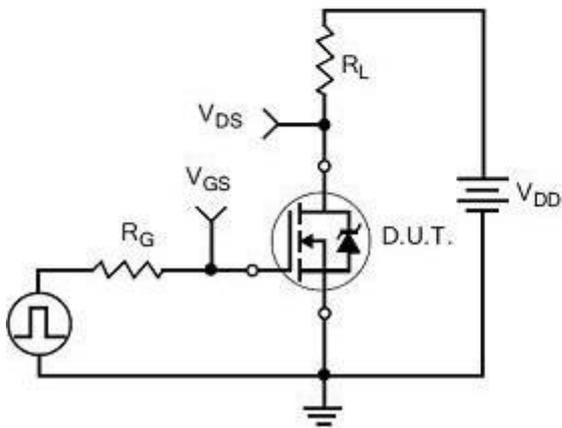
TEST CIRCUITS AND WAVEFORMS



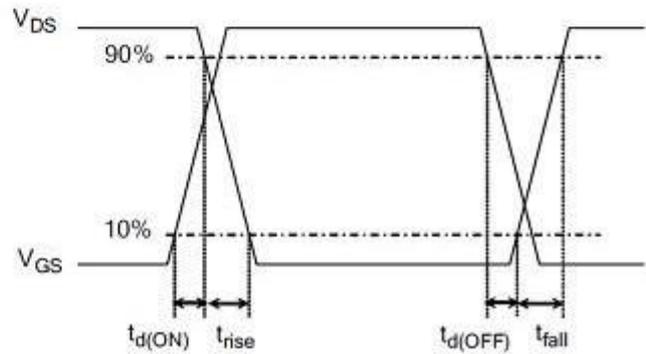
Gate Charge Test Circuit



Gate Charge Waveform

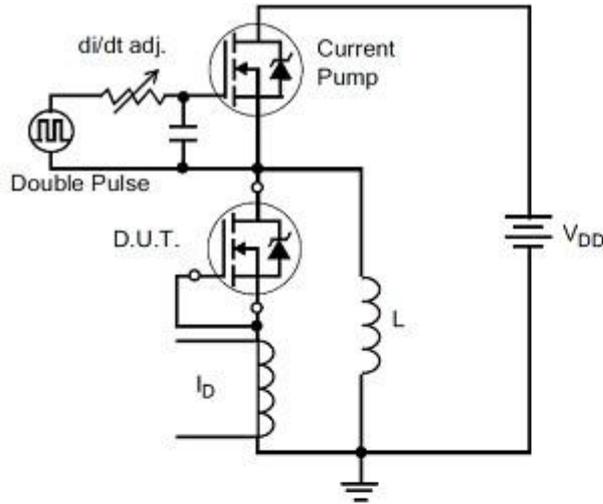


Resistive Switching Test Circuit

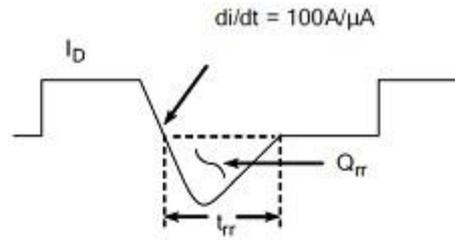


Resistive Switching Waveforms

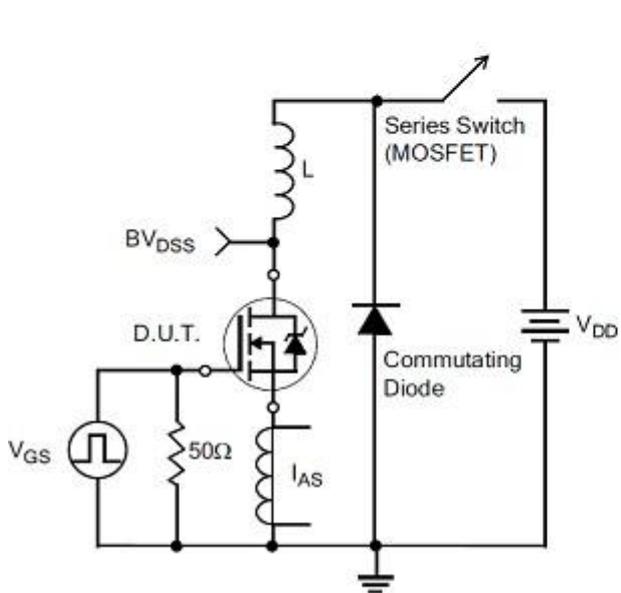
TEST CIRCUITS AND WAVEFORMS(Cont.)



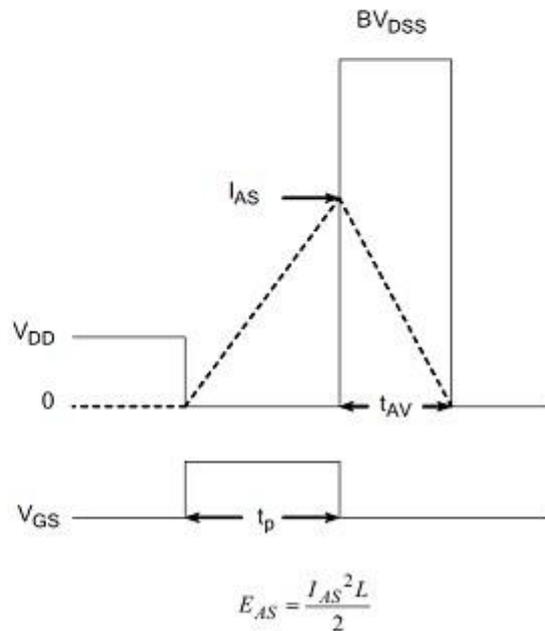
Diode Reverse Recovery Test Circuit



Diode Reverse Recovery Waveform

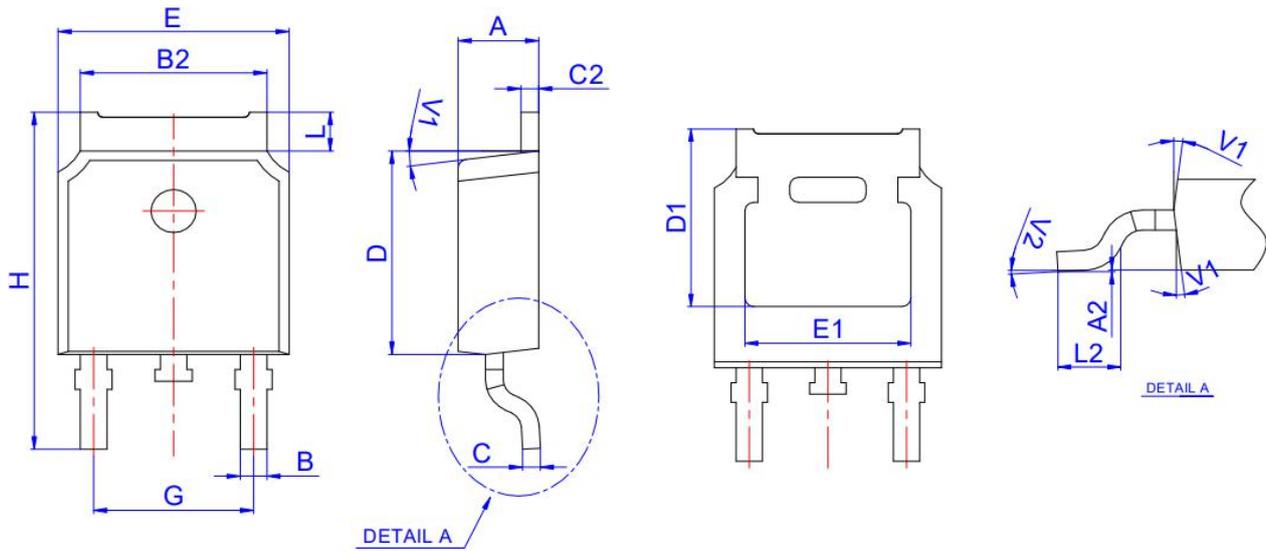


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

**TO-252 Package**



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°

## Revision history

### Document revision history

Date	Revision	Changes
25-Oct-2021	1.0	First release

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