

## 150V N-Ch Power MOSFET

### Feature

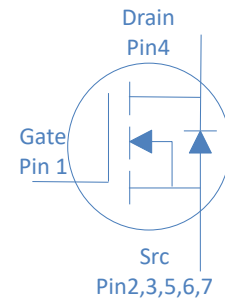
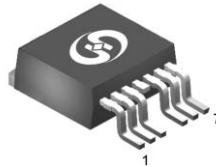
- ◇ High Speed Power Smooth Switching
- ◇ Enhanced Body diode dv/dt capability
- ◇ Enhanced Avalanche Ruggedness
- ◇ 100% UIS Tested, 100% Rg Tested
- ◇ Lead Free

### Application

- ◇ Synchronous Rectification in SMPS
- ◇ Hard Switching and High Speed Circuit
- ◇ Power Tools
- ◇ UPS
- ◇ Motor Control

$V_{DS}$		150	V
$R_{DS(on),typ}$	TO-263-7	3.8	m $\Omega$
$I_D$ (Silicon Limited)		213	A

TO-263-7



Part Number	Package	Marking
HGB041N15S	TO-263-7	GB041N15S

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

Parameter	Symbol	Conditions	Value	Unit
Continuous Drain Current (Silicon Limited)	$I_D$	$T_C=25^\circ\text{C}$	213	A
		$T_C=100^\circ\text{C}$	151	
Drain to Source Voltage	$V_{DS}$	-	150	V
Gate to Source Voltage	$V_{GS}$	-	$\pm 20$	V
Pulsed Drain Current	$I_{DM}$	-	650	A
Avalanche Energy, Single Pulse	$E_{AS}$	$L=0.4\text{mH}$ , $T_C=25^\circ\text{C}$	720	mJ
Power Dissipation	$P_D$	$T_C=25^\circ\text{C}$	429	W
Operating and Storage Temperature	$T_J$ , $T_{stg}$	-	-55 to 175	$^\circ\text{C}$

### Absolute Maximum Ratings

Parameter	Symbol	Max	Unit
Thermal Resistance Junction-Case	$R_{\theta JC}$	0.35	$^\circ\text{C/W}$
Thermal Resistance Junction-Ambient	$R_{\theta JA}$	60	$^\circ\text{C/W}$

**Electrical Characteristics at  $T_j=25^{\circ}\text{C}$  (unless otherwise specified)**
**Static Characteristics**

Parameter	Symbol	Conditions	Value			Unit
			min	typ	max	
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	150	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2	3	4	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS}=0V, V_{DS}=150V, T_j=25^{\circ}\text{C}$	-	-	1	$\mu A$
		$V_{GS}=0V, V_{DS}=150V, T_j=100^{\circ}\text{C}$	-	-	100	
Gate to Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
Drain to Source on Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$	-	3.8	4.3	$m\Omega$
Transconductance	$g_{fs}$	$V_{DS}=5V, I_D=20A$	-	70	-	S
Gate Resistance	$R_G$	$V_{GS}=0V, V_{DS}$ Open, $f=1\text{MHz}$	-	4.0	-	$\Omega$

**Dynamic Characteristics**

Input Capacitance	$C_{iss}$		-	5230	-	$pF$
Output Capacitance	$C_{oss}$	$V_{GS}=0V, V_{DS}=75V, f=1\text{MHz}$	-	745	-	
Reverse Transfer Capacitance	$C_{rss}$		-	11.5	-	
Total Gate Charge	$Q_g$		-	70	-	nC
Gate to Source Charge	$Q_{gs}$	$V_{DD}=75V, I_D=20A, V_{GS}=10V$	-	20	-	
Gate to Drain (Miller) Charge	$Q_{gd}$		-	10	-	
Turn on Delay Time	$t_{d(on)}$		-	19	-	ns
Rise time	$t_r$	$V_{DD}=75V, I_D=20A, V_{GS}=10V,$	-	24	-	
Turn off Delay Time	$t_{d(off)}$	$R_G=10\Omega,$	-	35	-	
Fall Time	$t_f$		-	11	-	

**Reverse Diode Characteristics**

Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_F=20A$	-	0.9	-	V
Reverse Recovery Time	$t_{rr}$	$V_R=75V, I_F=20A, dI_F/dt=100A/\mu s$	-	120	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	270	-	nC

Fig 1. Typical Output Characteristics

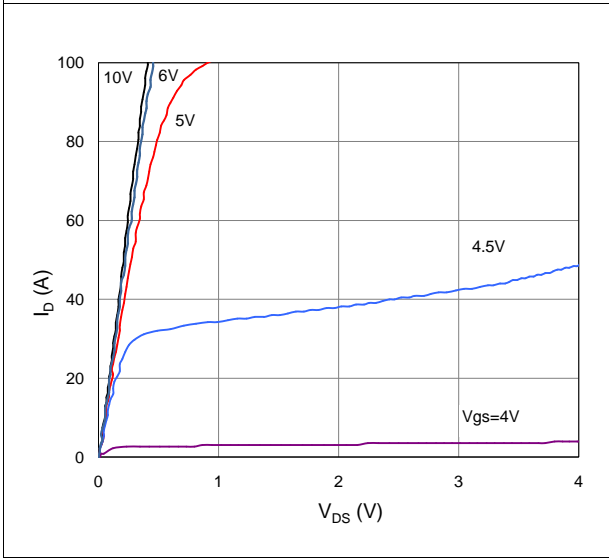


Figure 2. On-Resistance vs. Gate-Source Voltage

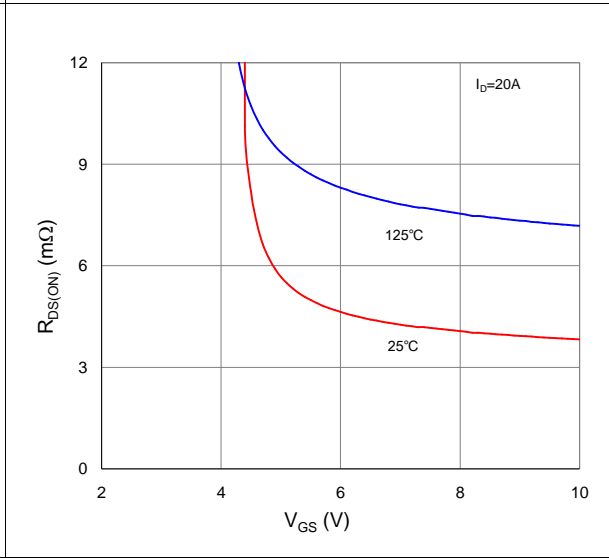


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

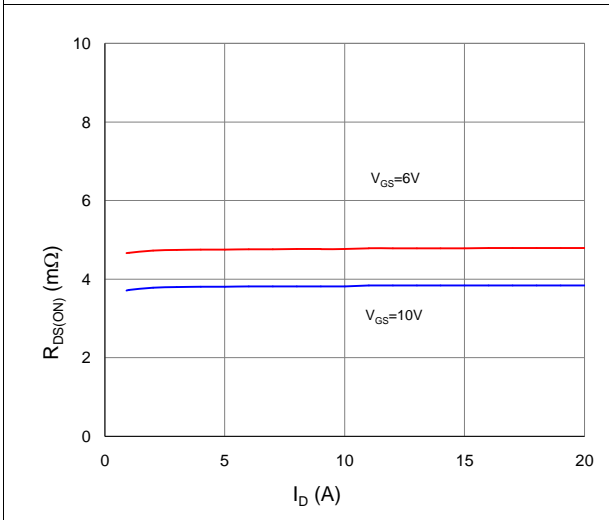


Figure 4. Normalized On-Resistance vs. Junction Temperature

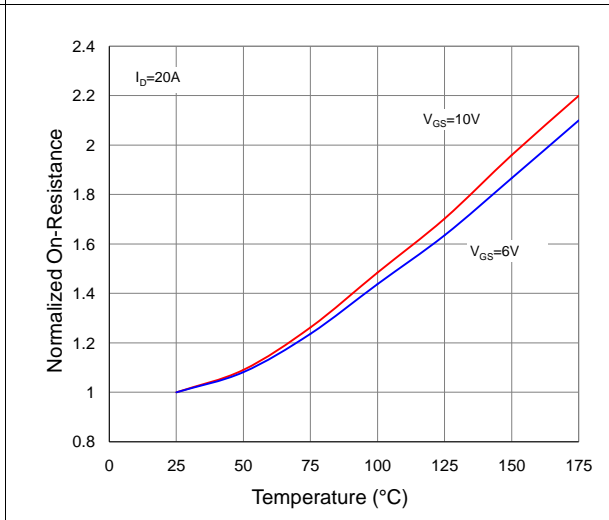


Figure 5. Typical Transfer Characteristics

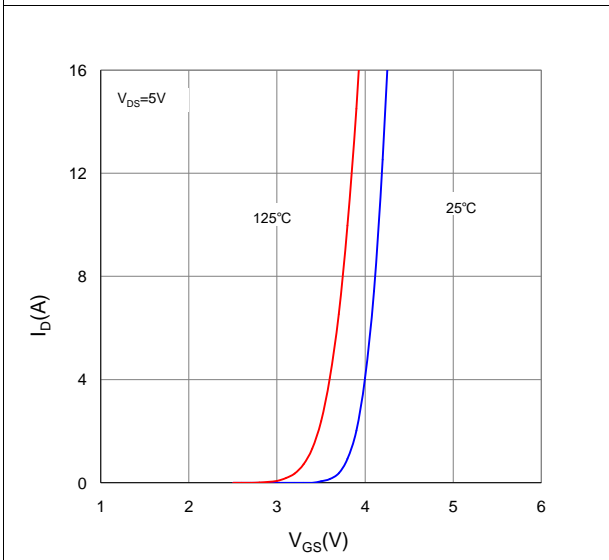


Figure 6. Typical Source-Drain Diode Forward Voltage

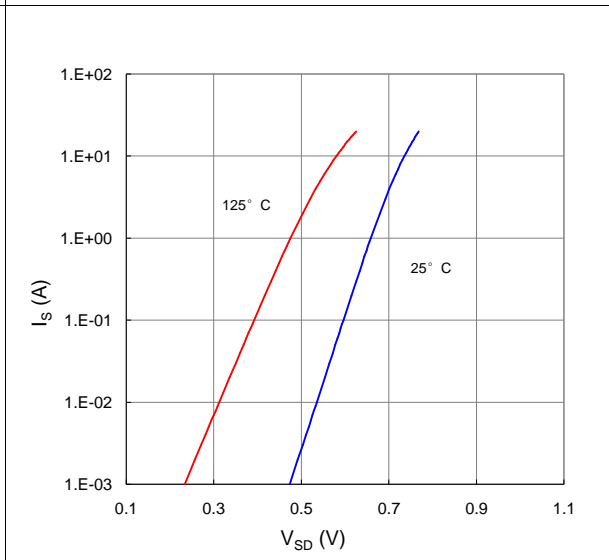


Figure 7. Typical Gate-Charge vs. Gate-to-Source Voltage

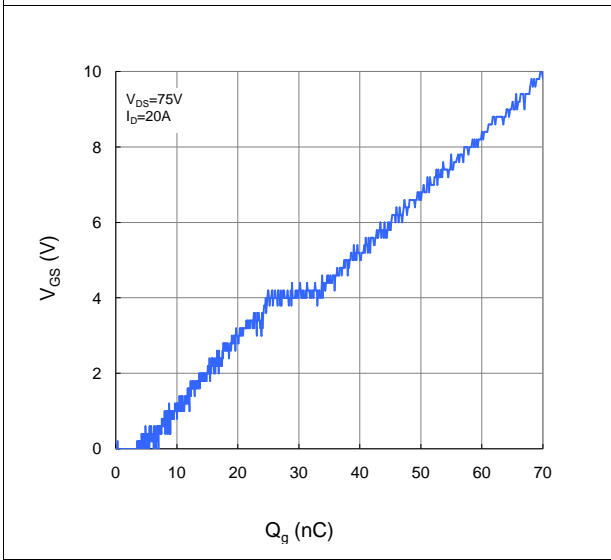


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

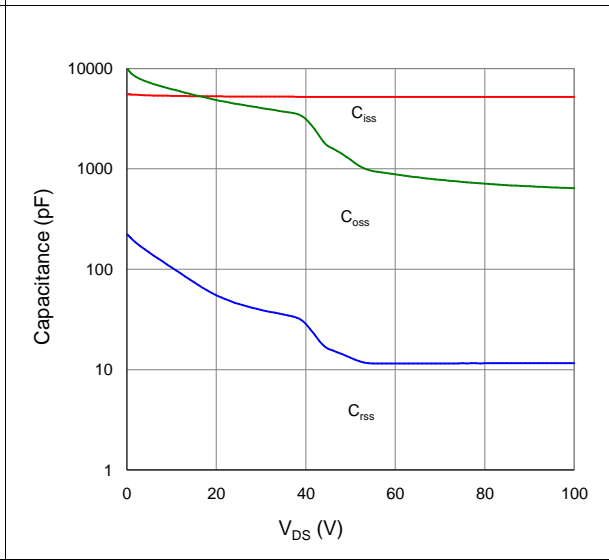


Figure 9. Maximum Safe Operating Area

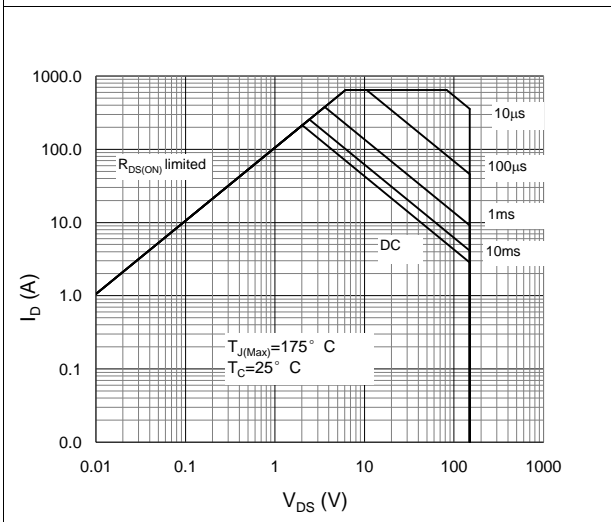


Figure 10. Maximum Drain Current vs. Case Temperature

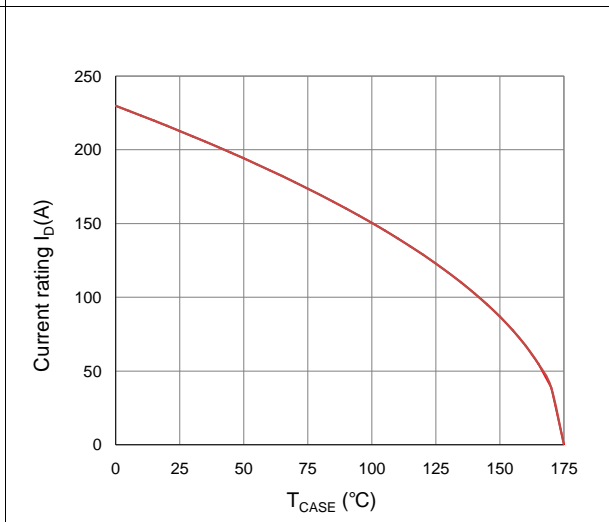
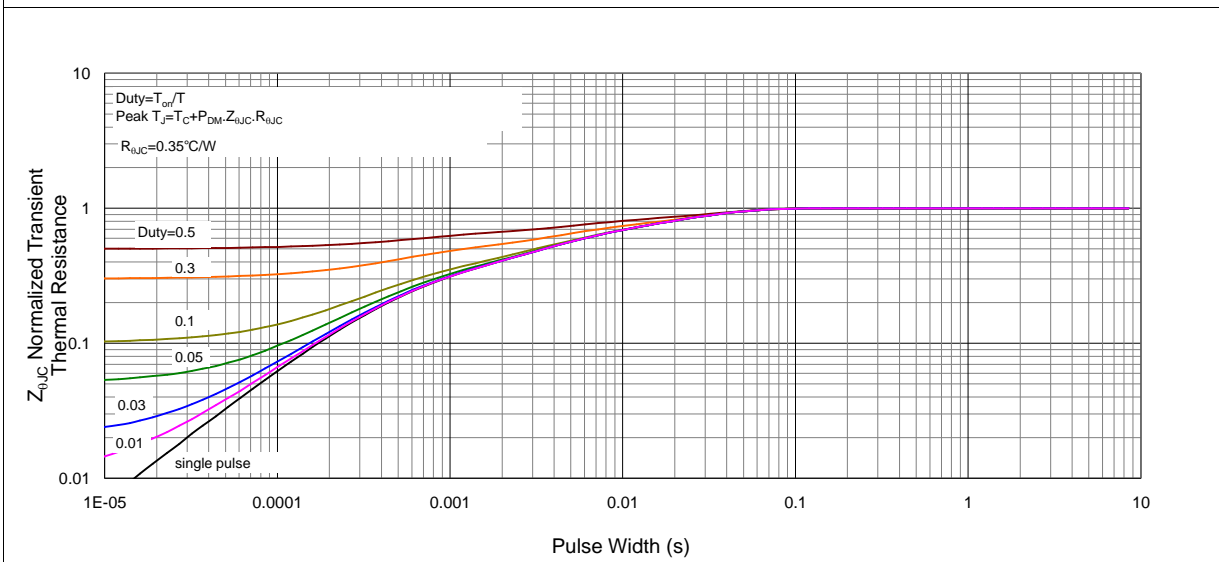
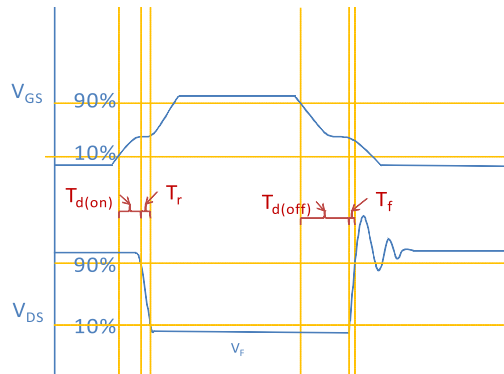
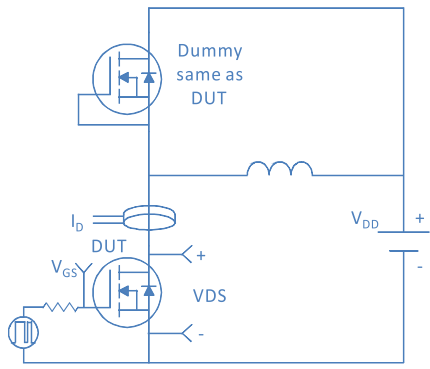


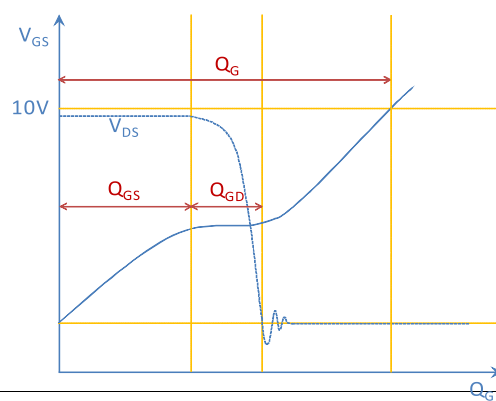
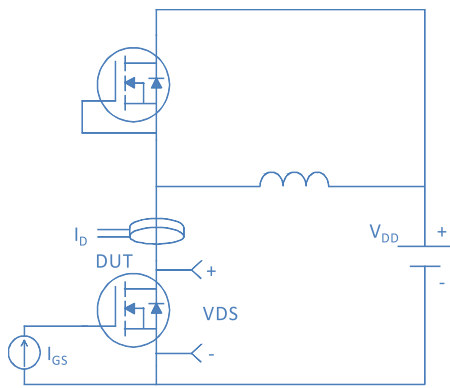
Figure 11. Normalized Maximum Transient Thermal Impedance, Junction-to-Case



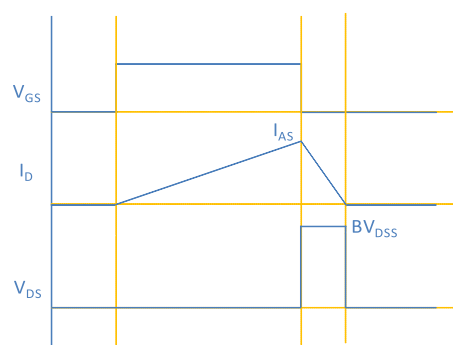
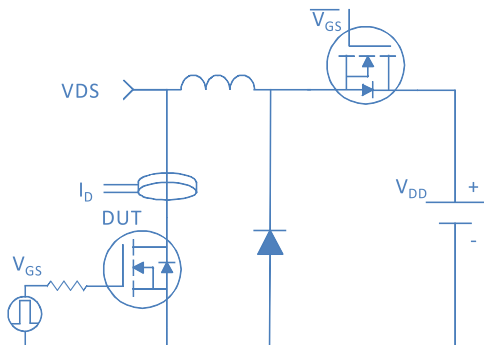
### Inductive switching Test



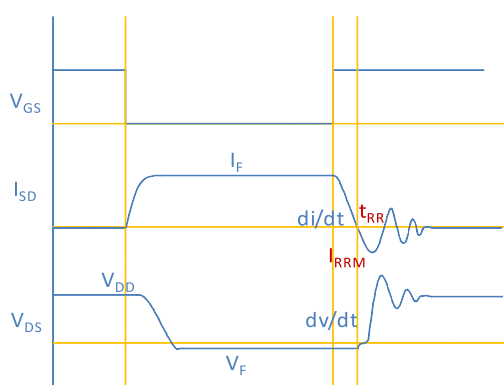
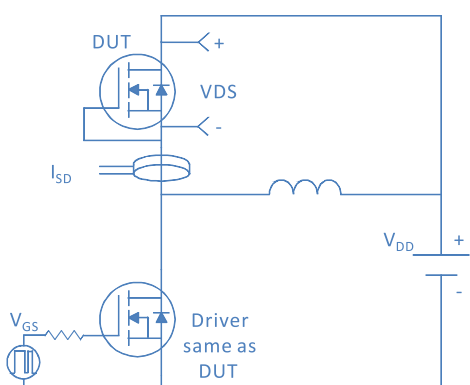
### Gate Charge Test



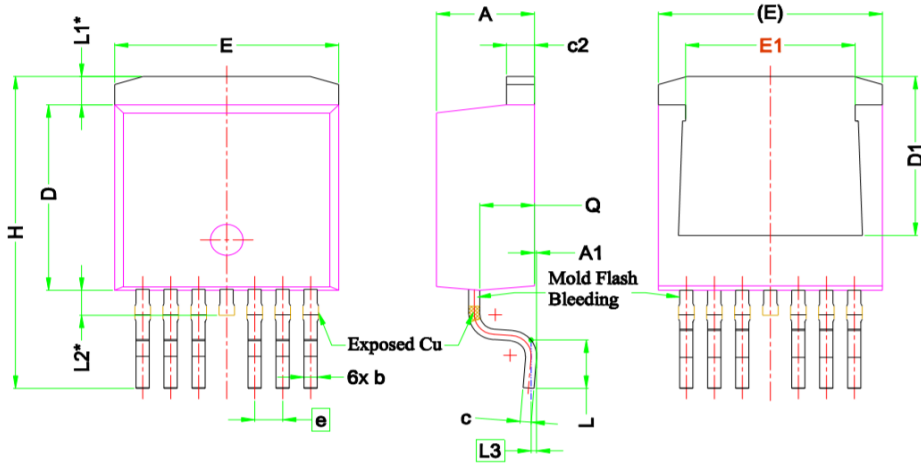
### Uclamped Inductive Switching (UIS) Test



### Diode Recovery Test



## TO-263-7, 7 leads



SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	4.24	4.44	4.64
A1	0.00	0.10	0.25
b	0.50	0.60	0.70
c	0.40	0.50	0.60
c2	1.15	1.27	1.40
D	8.82	8.92	9.02
D1	6.86	7.65	—
E	9.96	10.16	10.36
E1	6.89	7.77	7.89
e	1.27 BSC		
H	14.61	15.00	15.88
L	1.78	2.32	2.79
L1	1.36 REF.		
L2	1.20 REF.		
L3	0.25 BSC		
Q	2.30	2.48	2.70