

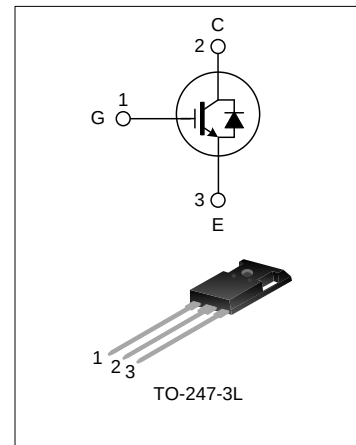
20A, 600V FIELD STOP IGBT

DESCRIPTION

The SGT20T60SDM1P7 field stop IGBT adopts Silan the 4th-generation trench Field Stop technology, features low conduction loss and switching loss, positive temperature coefficient, easy parallel operation, etc. It is applicable to inverters, UPS, SMPS, and PFC.

FEATURES

- 20A, 600V, $V_{CE(sat)}(typ.)=1.7V@I_C=20A$
- Low conduction loss
- Fast switching speed
- High breakdown voltage



NOMENCLATURE

SGT 20 T 60 S D M 1 P7	
IGBT series	Package
Current, 70: 70A	P7 : TO-247-3L F: TO-220F-3L
N : N Channel	1,2,3... : Version No.
NE : N-channel planar gate with ESD	Blank: Standard diode
T : Field Stop 3/4	M : Standard Diode, full range
U : Field Stop 4+	R : Rapid Diode
V : Field Stop 5	B : Rapid Diode, full range
W: Field Stop 6	S : Soft Diode, full range
X : Field Stop 7	D : Packaged with fast recovery diode
Voltage, 65: 650V	R : RC IGBT
120: 1200V	L : Ultra low switching, recommended frequency ~2KHz
	Q : Low switching, recommended frequency 2~20K
	S : Standard frequency, recommended frequency 5~40K
	F : Fast switching, recommended frequency 10~60K
	UF : Ultra fast switching, recommended frequency 40K~

ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing
SGT20T60SDM1P7	TO-247-3L	20T60SDM1	Pb free	Tube

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

Characteristics		Symbol	Ratings	Units
Collector to Emitter Voltage		V_{CE}	600	V
Gate to Emitter Voltage		V_{GE}	± 20	V
Collector Current	$T_C=25^{\circ}\text{C}$	I_C	40	A
	$T_C=100^{\circ}\text{C}$		20	
Pulsed Collector Current		I_{CM}	60	A
Diode current		I_F	20	A
Short-circuit time($V_{GE}=15\text{V}$, $V_{CC}=300\text{V}$)		T_{sc}	10	μs
Maximum Power Dissipation ($T_C=25^{\circ}\text{C}$)		P_D	46	W
Operating Junction Temperature		T_J	$-55\sim+175$	$^{\circ}\text{C}$
Storage Temperature Range		T_{stg}	$-55\sim+150$	$^{\circ}\text{C}$

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings	Units
Thermal Resistance, Junction to Case (IGBT)	$R_{\theta JC}$	0.65	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to Case (FRD)	$R_{\theta JC}$	1.19	$^{\circ}\text{C/W}$

ELECTRICAL CHARACTERISTICS OF IGBT ($T_C = 25^\circ\text{C}$, unless otherwise noted)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Units
Collector to Emitter Breakdown Voltage	BV_{CE}	$V_{GE}=0V, I_C=250\mu A$	600	--	--	V
C-E Leakage Current	I_{CES}	$V_{CE}=600V, V_{GE}=0V$	--	--	200	μA
G-E Leakage Current	I_{GES}	$V_{GE}=20V, V_{CE}=0V$	--	--	± 400	nA
G-E Threshold Voltage	$V_{GE(th)}$	$I_C=250\mu A, V_{CE}=V_{GE}$	4.0	5.0	6.5	V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=20A, V_{GE}=15V$	--	1.7	2.4	V
		$I_C=20A, V_{GE}=15V, T_C=125^\circ\text{C}$	--	1.9	--	V
Input Capacitance	C_{ies}	$V_{CE}=30V$	--	1100	--	pF
Output Capacitance	C_{oes}	$V_{GE}=0V$	--	55	--	
Reverse Transfer Capacitance	C_{res}	$f=1\text{MHz}$	--	22	--	
Turn-On Delay Time	$T_{d(on)}$	$V_{CE}=400V$ $I_C=20A$ $R_g=10\Omega$	--	19	--	ns
Rise Time	T_r		--	55	--	
Turn-Off Delay Time	$T_{d(off)}$		--	48	--	
Fall Time	T_f		--	115	--	
Turn-On Switching Loss	E_{on}	$V_{GE}=15V$	--	1	--	mJ
Turn-Off Switching Loss	E_{off}	Inductive load	--	0.3	--	
Total Switching Loss	E_{st}		--	1.3	--	
Total Gate Charge	Q_g	$V_{CE}=400V, I_C=20A,$ $V_{GE}=15V$	--	52	--	nC
Gate to Emitter Charge	Q_{ge}		--	15	--	
Gate to Collector Charge	Q_{gc}		--	22	--	

ELECTRICAL CHARACTERISTICS OF FRD ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Units
Diode Forward Voltage	V_{fm}	$I_F=20A, T_C=25^\circ\text{C}$	--	1.8	--	V
		$I_F=20A, T_C=125^\circ\text{C}$	--	1.5	--	
Diode Reverse Recovery Time	T_{rr}	$I_{ES}=20A, dI_{ES}/dt=200A/\mu s$	--	33.69	--	ns
Diode Reverse Recovery Charge	Q_{rr}	$I_{ES}=20A, dI_{ES}/dt=200A/\mu s$	--	73.31	--	nC

TYPICAL CHARACTERISTICS CURVE

Figure 1-1. Typical Output Characteristics

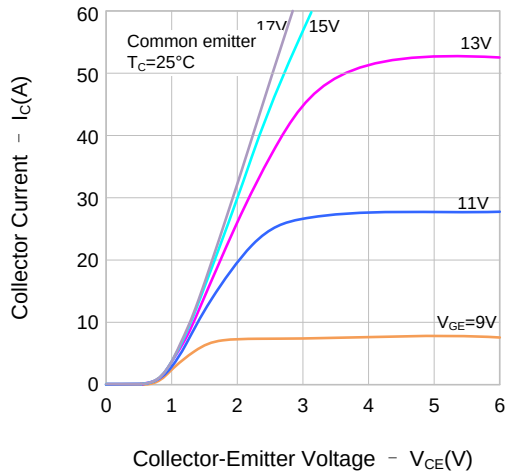


Figure 1-2. Typical Output Characteristics

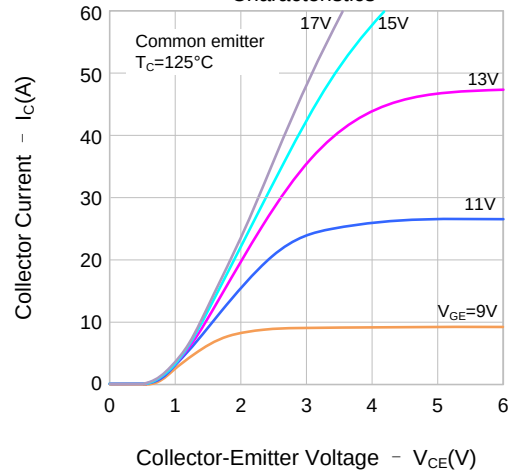


Figure 2. Typical Saturation Voltage Characteristic

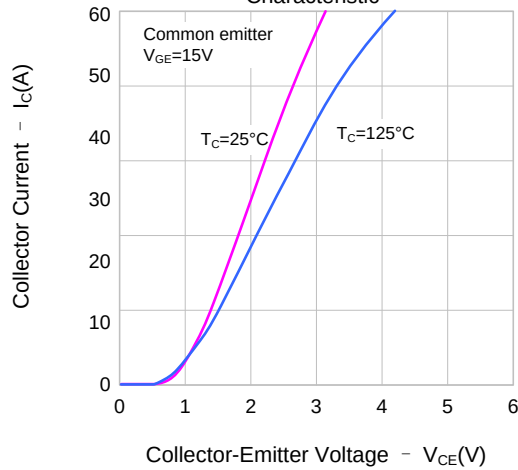


Figure 3. Transfer Characteristic

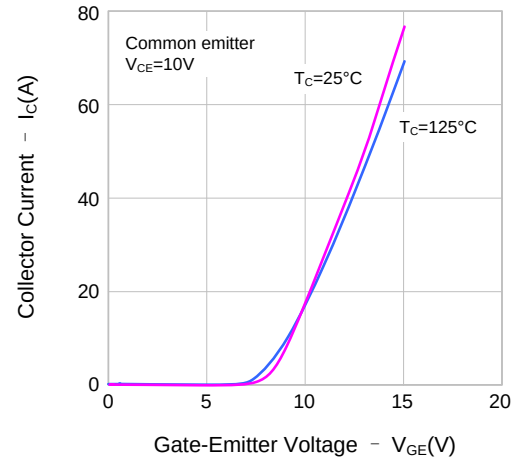


Figure 4. Saturation Voltage vs. V_{GE}

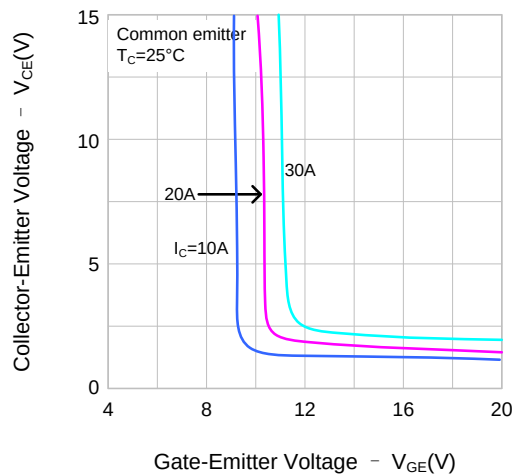
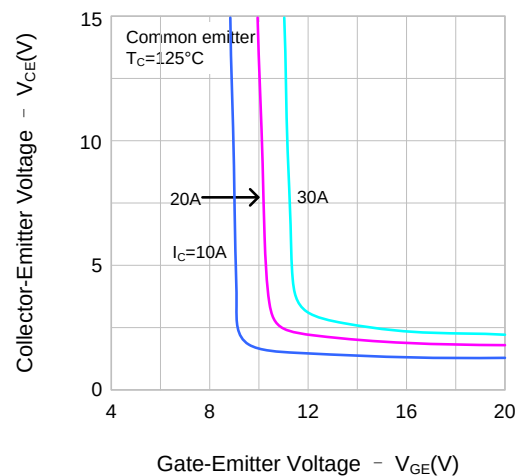


Figure 5. Saturation Voltage vs. V_{GE}



TYPICAL CHARACTERISTICS CURVE (CONTINUED)

Figure 6. Saturation Voltage vs. Temperature

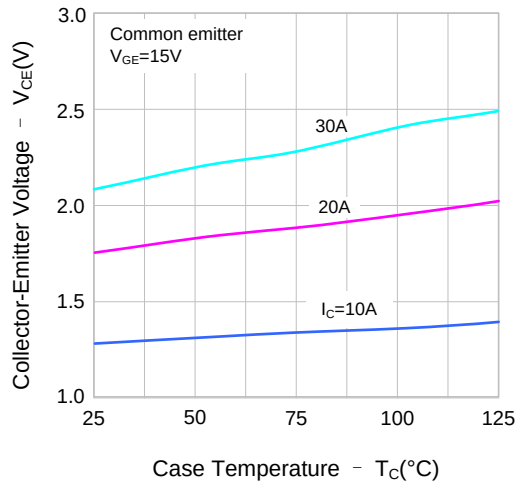


Figure 7. Capacitance Characteristic

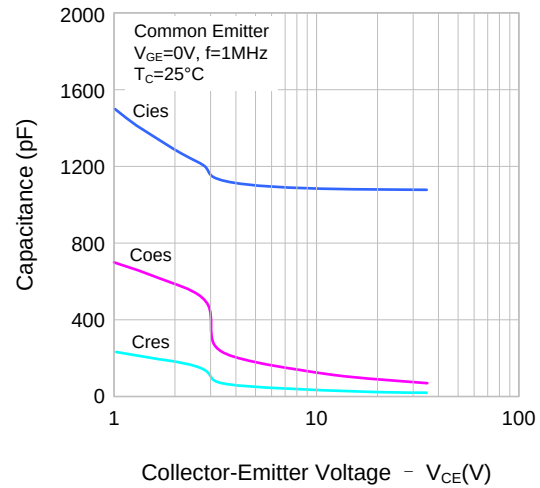


Figure 8. Gate Charge Characteristic

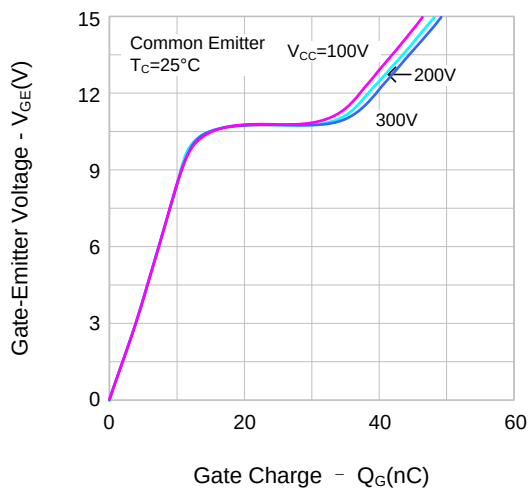


Figure 9. Turn-on Characteristic vs. Gate Resistance

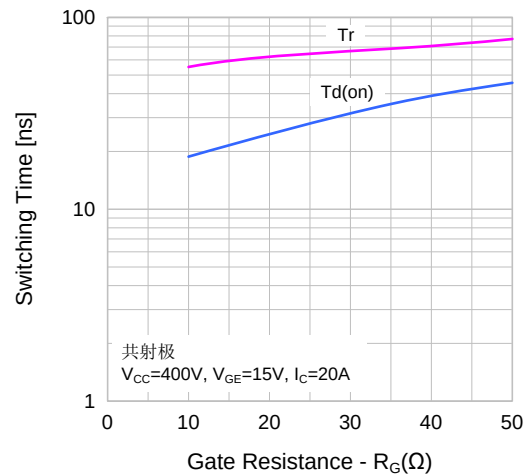


Figure 10. Turn-off Characteristic vs. Gate Resistance

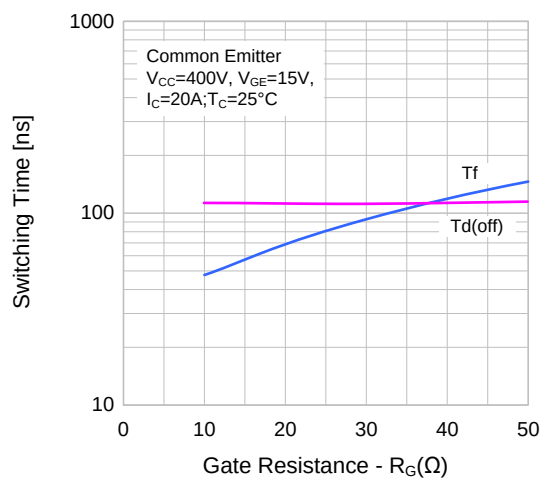
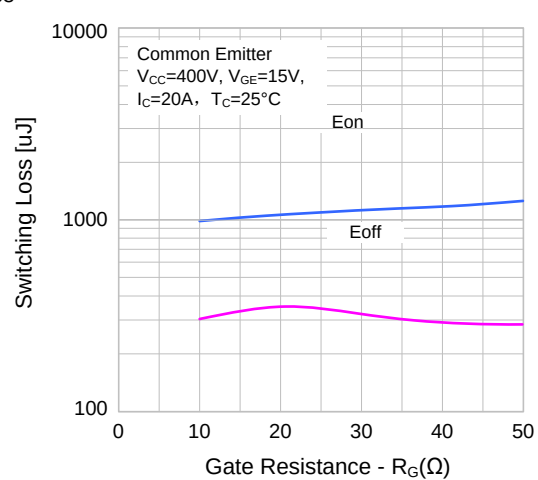


Figure 11. Switching Loss vs. Gate Resistance



TYPICAL CHARACTERISTICS CURVE (CONTINUED)

Figure 12. Turn-on Characteristic vs. Collector Current

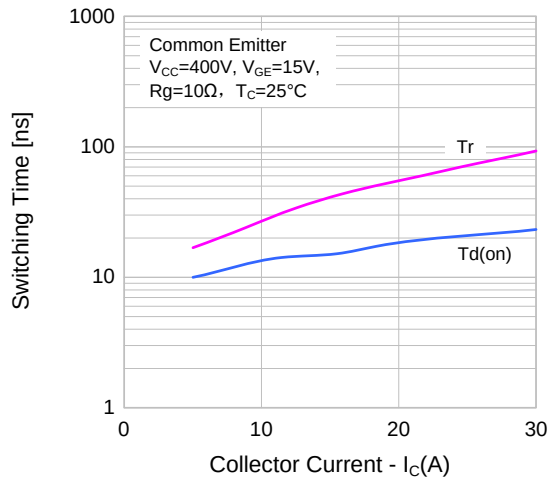


Figure 13. Turn-off Characteristic vs. Collector Current

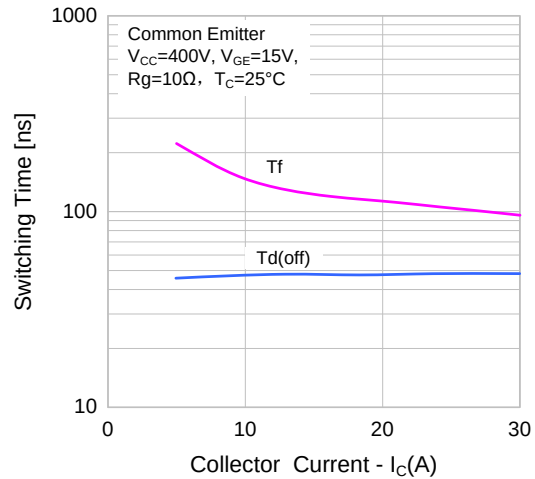


Figure 14. Turn-off Loss vs. Collector Current

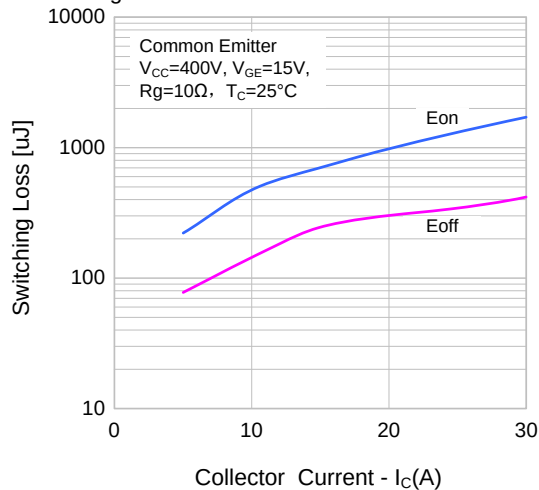


Figure 15. Forward Characteristic

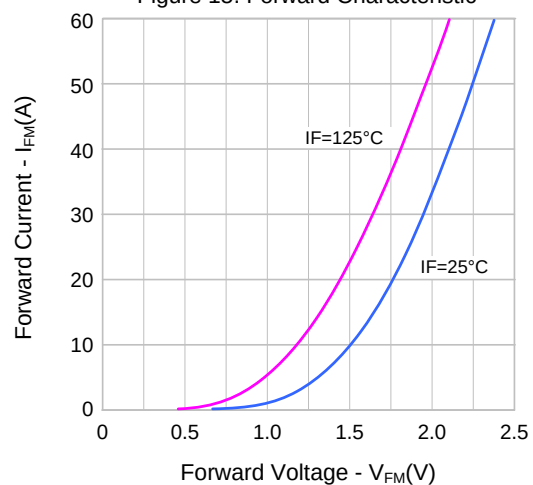


Figure 16. Reverse Recovery Time vs. Forward Current

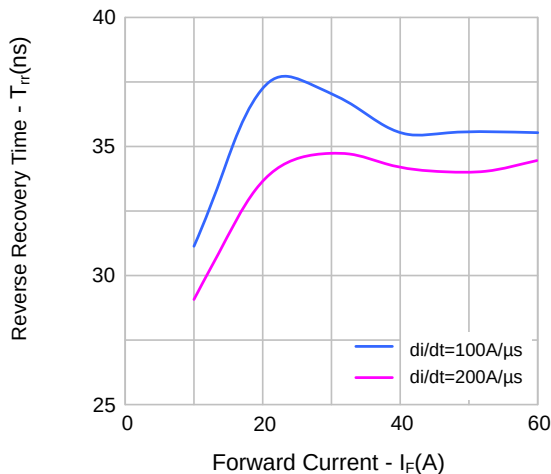
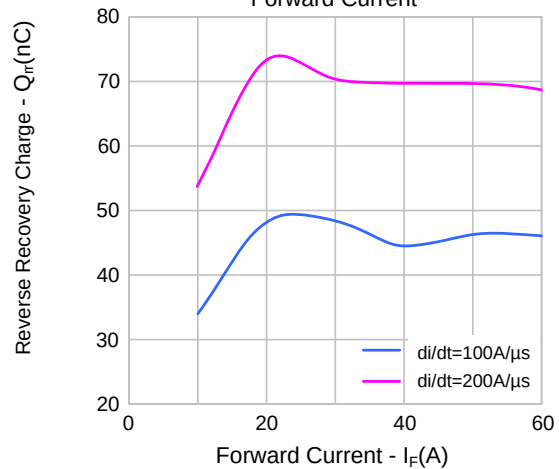
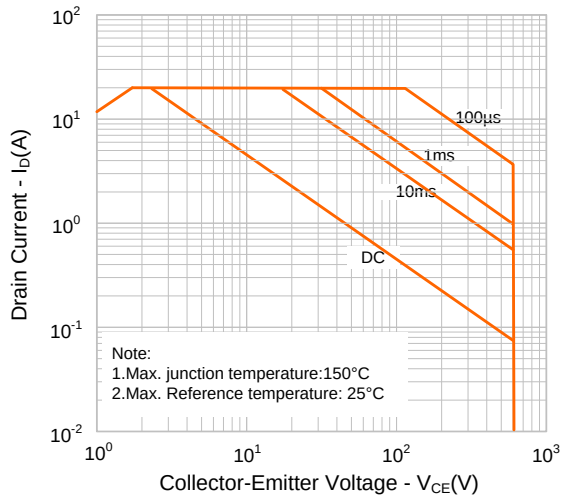


Figure 17. Reverse Recovery Charge vs. Forward Current



TYPICAL CHARACTERISTICS CURVE (CONTINUED)

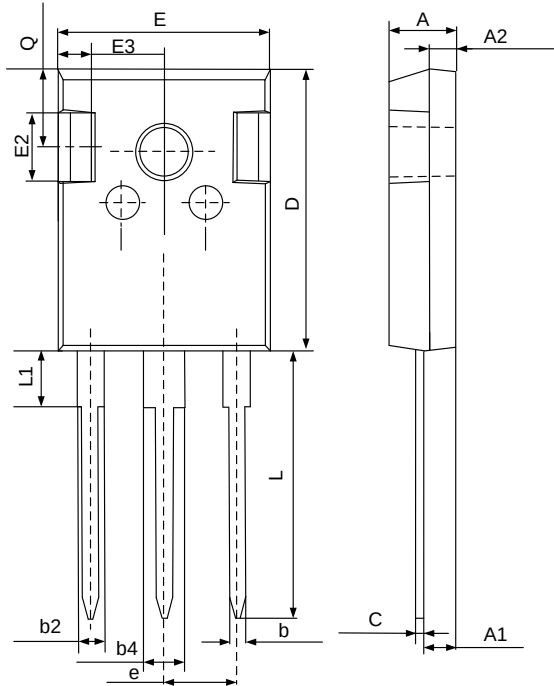
Figure 18. Max. Safe Operating Area



PACKAGE OUTLINE

TO-247-3L

Unit: mm



SYMBOL	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	----	1.36
b2	1.91	----	2.21
b4	2.91	----	3.21
c	0.51	----	0.75
D	20.80	21.00	21.30
E	15.50	15.80	16.10
E2	4.40	5.00	5.20
E3	2.30	2.50	2.70
e	5.44 BSC		
L	19.72	19.92	20.22
L1	----	----	4.30
Q	5.60	5.80	6.00

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Rev.: 1.1

Revision History:

1. Update NOMENCLATURE
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Rev.: 1.0

Revision History:

1. First release
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