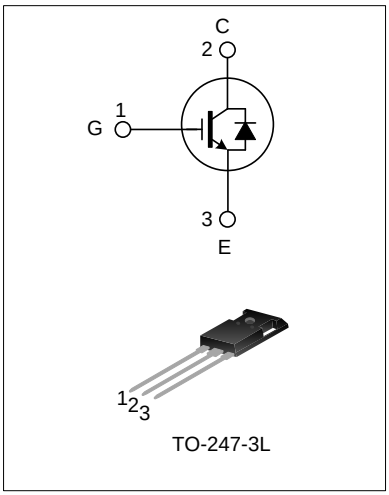
070A, 650V FIELD STOP IGBT

DESCRIPTION

SGT70N65FD1P7 using Field Stop IGBT technology, offers the optimum performance for induction Heating, UPS, SMPS and PFC application.



FEATURES

- 70A, 650V, $V_{CE(sat)(typ.)}$=2.3V@I_C=70A
- Low conduction loss
- Fast switching
- High input impedance

NOMENCLATURE

SGT 70 N 65 F D X 1 P7

IGBT series

Current, 70: 70A

N : N Channel
NE : N-channel planar gate with ESD
T : Field Stop 3/4
U : Field Stop 4+
V : Field Stop 5
W: Field Stop 6
X : Field Stop 7

Voltage, 65: 650V
120: 1200V

Package
P7 : TO-247-3L
F : TO-220F-3L etc.

1,2,3⋯ : Version No.

Blank: Standard diode
M : Standard Diode, full range
R : Rapid Diode
B : Rapid Diode, full range
S : Soft Diode, full range

D : Packaged with fast recovery diode
R : RC IGBT

L : Low saturation voltage, f<2KHz
Q : Low saturation voltage, f=2~20KHz
S : Standard, f=20~30KHz
F : Super fast switching, f=30~100KHz
UF : Ultra fast switching, f>100KHz

ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SGT70N65FD1P7	TO-247-3L	70N65FD1P7	Pb free	Tube

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Parameter		Symbol	Ratings	Units
Collector to Emitter Voltage		V_{CE}	650	V
Gate to Emitter Voltage		V_{GE}	±20	V
Collector Current	T_C=25°C	I_C	140	A
	T_C=100°C		70	
Pulsed Collector Current		I_{CM}	210	A
Power Dissipation(T_C=25°C)		P_D	321	W
Operating Junction Temperature Range		T_J	-55～+150	°C
Storage Temperature Range		T_{stg}	-55～+150	°C

THERMAL CHARACTERISTICS

Parameter	Symbol	Ratings	Units
Thermal Resistance, Junction to Case (IGBT)	$R_{\theta JC}$	0.39	°C/W
Thermal Resistance, Junction to Case (FRD)	$R_{\theta JC}$	1.10	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	40	°C/W

ELECTRICAL CHARACTERISTICS OF IGBT (T_C = 25°C unless otherwise noted)

Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Units
Collector to Emitter Breakdown Voltage	BV_{CE}	V_{GE}=0V,I_C=250μA	650	--	--	V
C-E Leakage Current	I_{CES}	V_{CE}=650V,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=250μA,V_{CE}=V_{GE}	4.0	5.0	6.5	V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=70A,V_{GE}=15V	--	2.3	2.7	V
		I_C=70A, V_{GE}=15V,T_C=125°C	--	2.6	--	V
Input Capacitance	C_{ies}	V_{CE}=30V	--	2850	--	pF
Output Capacitance	C_{oes}	V_{GE}=0V	--	390	--	
Reverse Transfer Capacitance	C_{res}	f=1MHz	--	85	--	
Turn-On Delay Time	$T_{d(on)}$	V_{CE}=400V I_C=70A R_g=10Ω V_{GE}=15V Inductive Load	--	40	--	ns
Rise Time	T_r		--	171	--	
Turn-Off Delay Time	$T_{d(off)}$		--	211	--	
Fall Time	T_f		--	141	--	
Turn-On Switching Loss	E_{on}		--	4.9	--	mJ
Turn-Off Switching Loss	E_{off}		--	2.5	--	
Total Switching Loss	E_{st}		--	7.4	--	
Total Gate Charge	Q_g	V_{CE} = 400V, I_C=70A, V_{GE} = 15V	--	189	--	nC
Gate to Emitter Charge	Q_{ge}		--	28	--	
Gate to Collector Charge	Q_{gc}		--	107	--	

ELECTRICAL CHARACTERISTICS OF FRD (T_C = 25°C unless otherwise noted)

Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Units
Diode Forward Voltage	V_{FM}	I_F=75A, T_C=25°C	--	1.4	2	V
		I_F=75A, T_C=125°C	--	1.305	--	
Diode Reverse Recovery Time	T_{rr}	I_{ES}=75A, dI_{ES}/dt=200A/μs	--	79	--	ns
Diode Reverse Recovery Charge	Q_{rr}	I_{ES}=75A, dI_{ES}/dt=200A/μs	--	350	--	nC

TYPICAL CHARACTERISTIC CURVES

Figure 1. Typical Output Characteristics

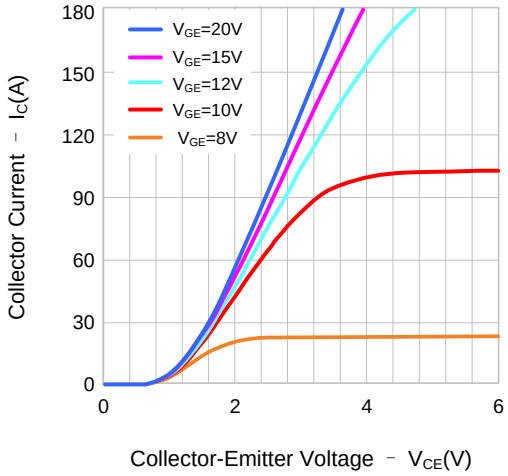


Figure 2. Transmission Characteristics

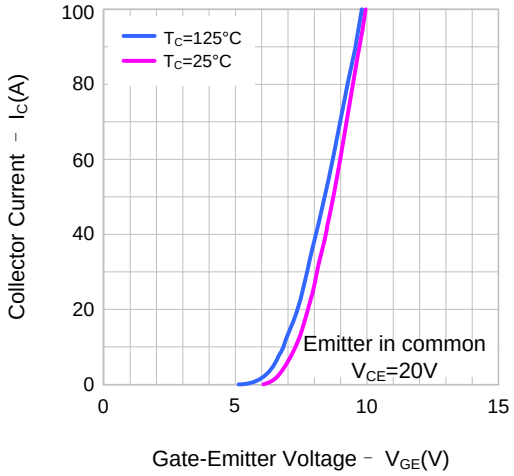


Figure 3. Typical Saturation Voltage Characteristics

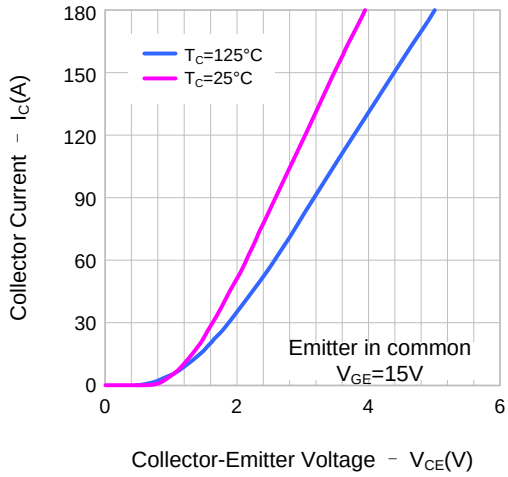


Figure 4. Saturation Voltage vs. Gate-emitter Voltage

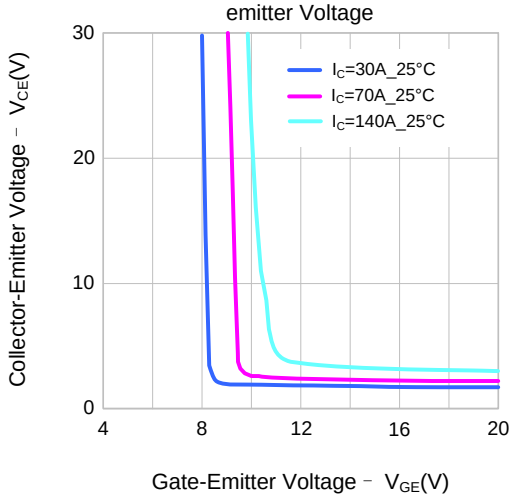


Figure 5. Saturation Voltage vs. Gate-emitter Voltage

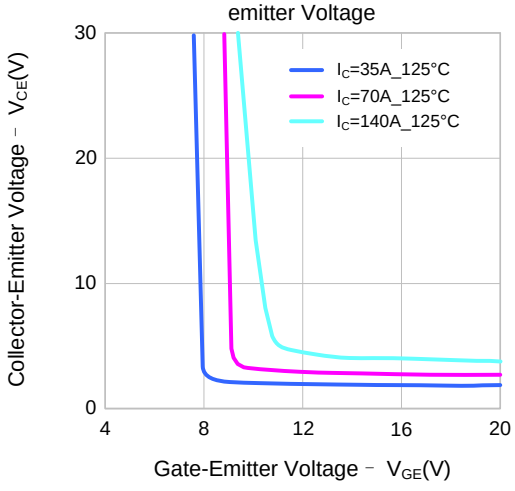
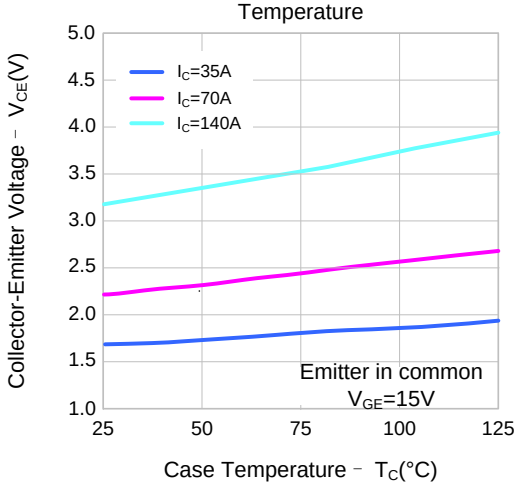


Figure 6. Saturation Voltage vs. Case Temperature



TYPICAL CHARACTERISTIC CURVES(continued)

Figure 7. Capacitance Characteristics

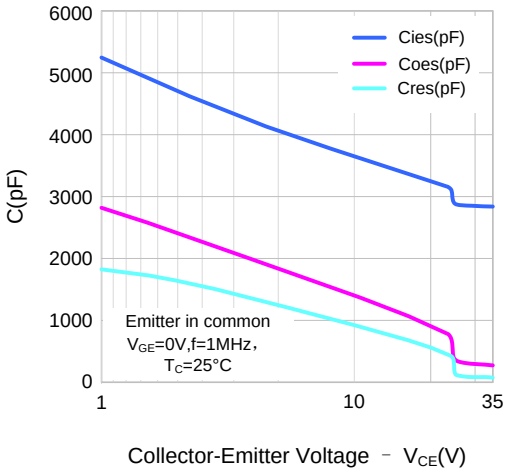


Figure 8. Gate Charge Characteristics

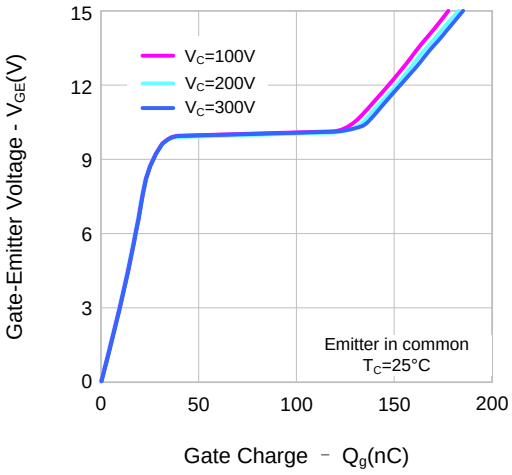


Figure 9. Turn-on Characteristics vs. Gate Resistance

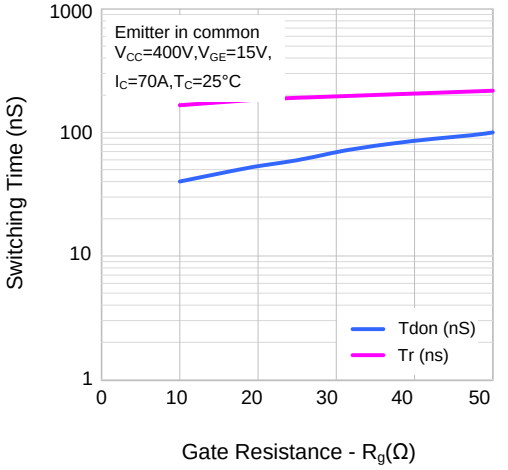


Figure 10. Turn-off Characteristics vs. Gate Resistance

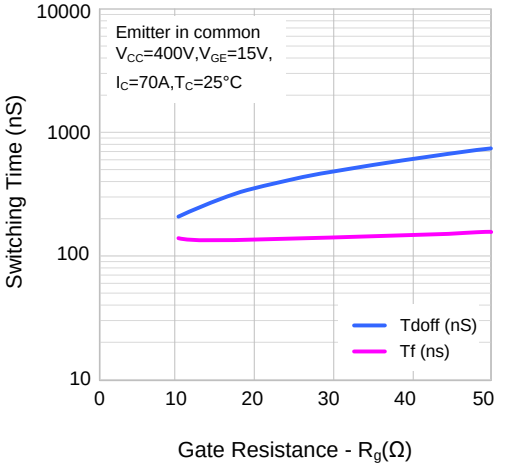


Figure 11. Switching Loss vs. Gate Resistance

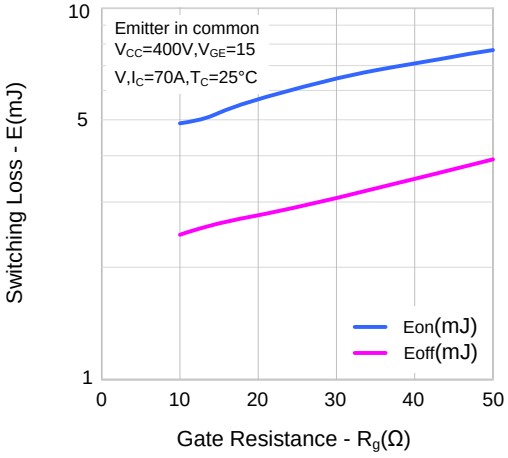
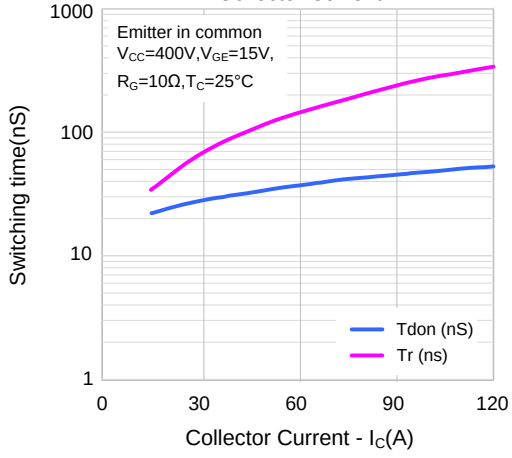


Figure 12. Turn-on Characteristics vs. Collector Current



TYPICAL CHARACTERISTIC CURVES(continued)

Figure 13. Turn-off Characteristics vs. Collector Current

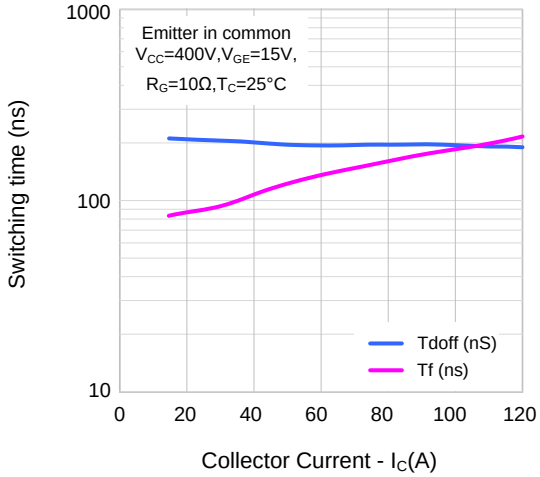


Figure 14. Switching Characteristics vs. Collector Current

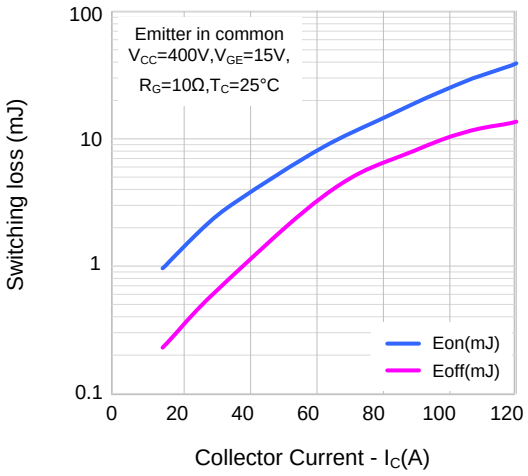


Figure 15. Forward Characteristics

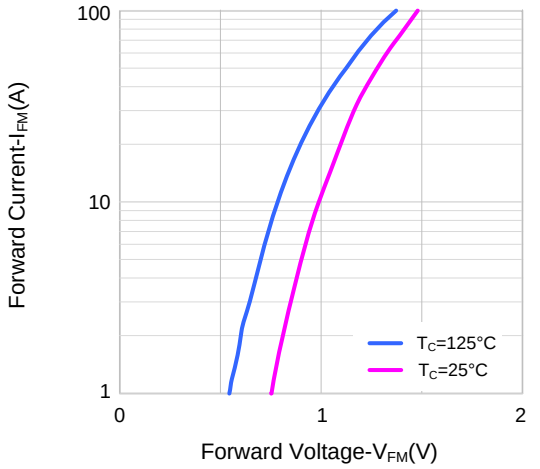


Figure 16. Reverse Recovery Time vs. Forward Current

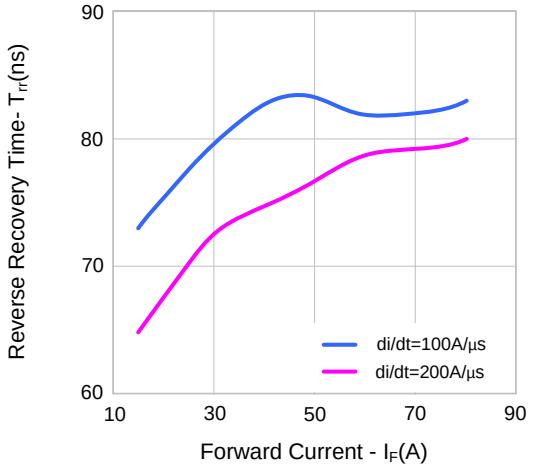


Figure 17. Reverse Recovery Charge vs. Forward Current

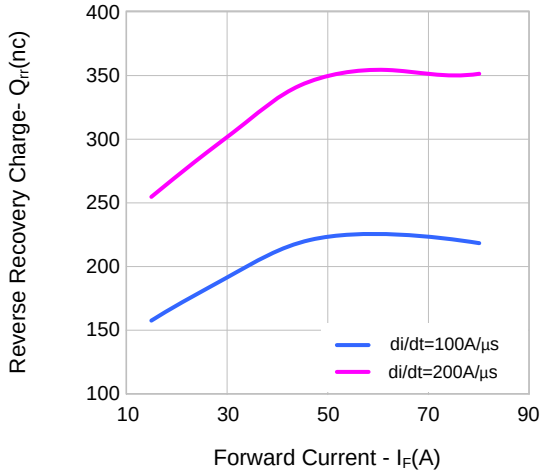
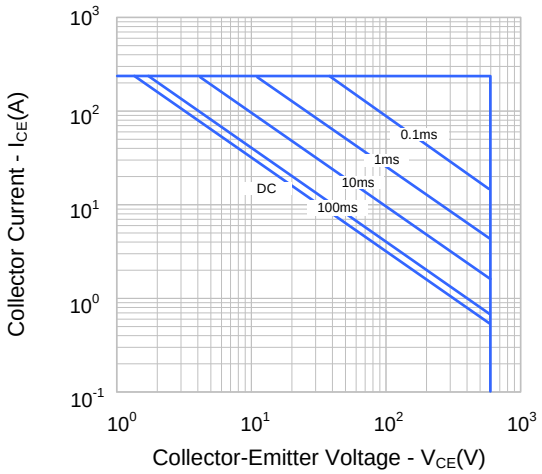


Figure 18. Maximum Safety Operating Area



TYPICAL CHARACTERISTIC CURVES(continued)

Figure 19. Transient Thermal Resistance-Pulse Width (IGBT)

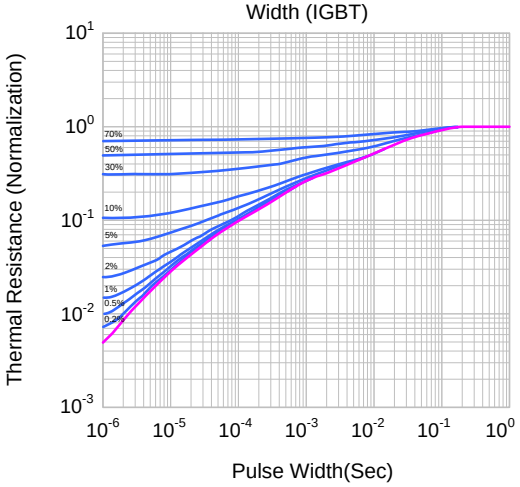
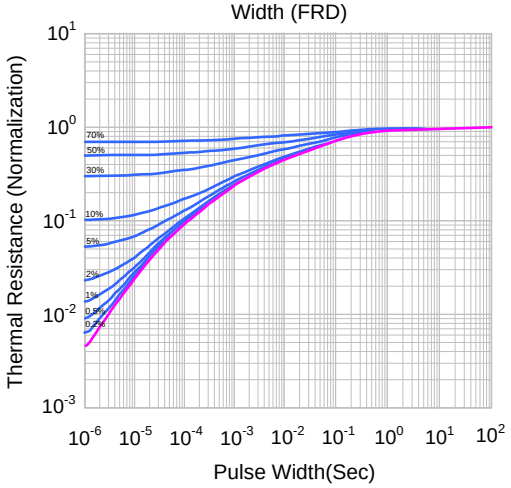
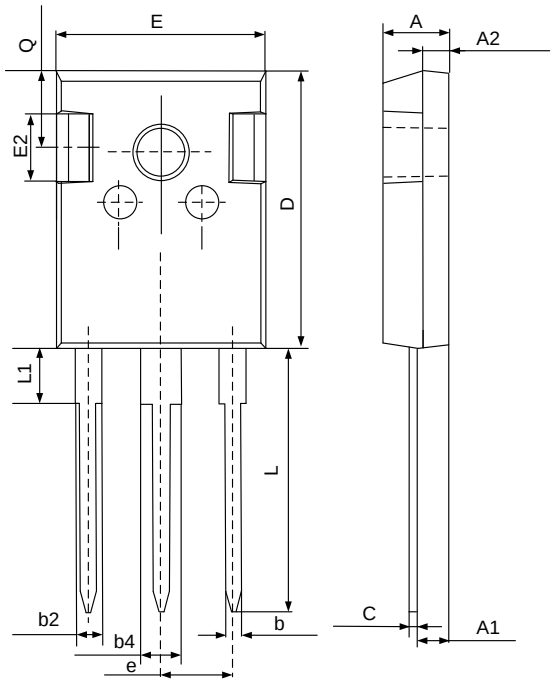


Figure 20.Transient Thermal Resistance-Pulse Width (FRD)



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	– – –	2.25
b4	2.91	– – –	3.25
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
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.: 1.4

Revision History:

1. Modify the package outline of TO-247-3L
2. Update important notice

Rev.: 1.3

Revision History:

1. Modify NOMENCLATURE and the package outline of TO-247-3L

Rev.: 1.2

Revision History:

1. Modify ELECTRICAL CHARACTERISTICS OF FRD

Rev.: 1.1

Revision History:

1. ModifyTyp. of C_{oes}
2. Modify Marking

Rev.: 1.0

Revision History:

1. First release