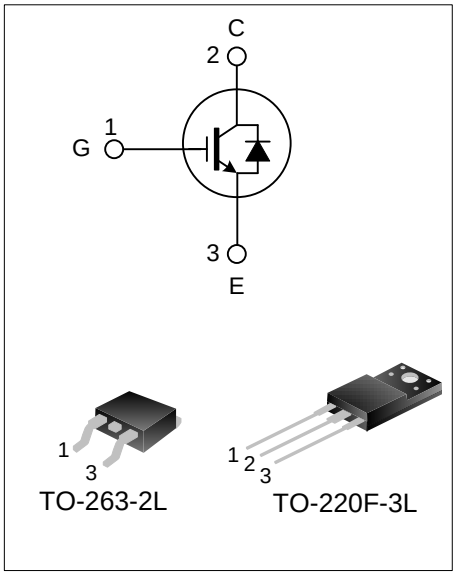
10A, 600V FIELD STOP IGBT

DESCRIPTION

The SGT10T60SD1S/F field stop IGBT adopts Silan Field Stop III technology, features low conduction loss and switching loss, is applicable to UPS, SMPS and PFC fields.



FEATURES

- 10A, 600V, $V_{CE(sat)(typ.)}$=1.65V@I_C=10A
- Low conduction loss
- Fast switching
- High input impedance

NOMENCLATURE

SGT 10 T 60 S D X 1 S

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
D : TO-263; F:TO-220F-3L

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 : Ultra low switching，recommended frequency ~2KHz
Q : Low switching，recommended frequency2~20K
S : Standard frequency，recommended frequency5~40K
F : Fast switching，recommended frequency10~60K
UF : Ultra fast switching，recommended frequency 40K~

ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SGT10T60SD1S	TO-263-2L	10T60SD1S	Halogen free	Tube
SGT10T60SD1STR	TO-263-2L	10T60SD1S	Halogen free	Tape & reel
SGT10T60SD1F	TO-220F-3L	10T60SD1F	pb free	Tube

ABSOLUTE MAXIMUM RATINGS (T_C=25°C UNLESS OTHERWISE NOTED)

Characteristics		Symbol	Ratings		Unit
			SGT10T60SD1S	SGT10T60SD1F	
Collector to Emitter Voltage		V_{CE}	600		V
Gate to Emitter Voltage		V_{GE}	±20		V
Collector Current	T_C=25°C	I_C	20		A
	T_C=100°C		10		
Pulsed Collector Current		I_{CM}	15		A
Diode Current		I_F	10		A
Maximum Power Dissipation (T_C=25°C)		P_D	88	27	W
Operating Junction Temperature		T_J	-55～+150		°C
Storage Temperature Range		T_{stg}	-55～+150		°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings		Unit
		SGT10T60SD1S	SGT10T60SD1F	
Thermal Resistance, Junction to Case (IGBT)	$R_{\theta JC}$	1.42	4.6	°C/W
Thermal Resistance, Junction to Case (FRD)	$R_{\theta JC}$	4.0	5.6	°C/W

ELECTRICAL CHARACTERISTICS OF IGBT (T_C=25°C, UNLESS OTHERWISE NOTED)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Collector to Emitter Breakdown Voltage	BV_{CE}	V_{GE}=0V, I_C=250μA	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=250μA, V_{CE}=V_{GE}	3.5	5.5	6.5	V
Collector to Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=10A, V_{GE}=15V	--	1.65	2	V
		I_C=10A, V_{GE}=15V, T_C=125°C	--	1.9	--	V
Input Capacitance	C_{ies}	V_{CE}=30V	--	540	--	pF
Output Capacitance	C_{oes}	V_{GE}=0V	--	35	--	
Reverse Transfer Capacitance	C_{res}	f=1MHz	--	12	--	
Turn-On Delay Time	$T_{d(on)}$	V_{CE}=400V I_C=10A R_g=10Ω V_{GE}=15V Inductive load	--	9	--	ns
Rise Time	T_r		--	28	--	
Turn-Off Delay Time	$T_{d(off)}$		--	26	--	
Fall Time	T_f		--	128	--	
Turn-On Switching Loss	E_{on}		--	0.49	--	mJ
Turn-Off Switching Loss	E_{off}		--	0.16	--	
Total Switching Loss	E_{st}		--	0.65	--	
Total Gate Charge	Q_g	V_{CE} = 400V, I_C=10A, V_{GE} = 15V	--	27	--	nC
Gate to Emitter Charge	Q_{ge}		--	8.5	--	
Gate to Collector Charge	Q_{gc}		--	8.8	--	

ELECTRICAL CHARACTERISTICS OF FRD (T_C=25°C UNLESS OTHERWISE NOTED)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_{FM}	I_F=5A, T_C=25°C	--	1.7	--	V
		I_F=5A, T_C=125°C	--	1.4	--	
Diode Reverse Recovery Time	T_{rr}	I_{ES}=5A, dI_{ES}/dt=200A/μs	--	20	--	ns
Diode Reverse Recovery Charge	Q_{rr}	I_{ES}=5A, dI_{ES}/dt=200A/μs	--	30	--	nC

TYPICAL CHARACTERISTICS CURVE

Figure 1. Typical Output Characteristics

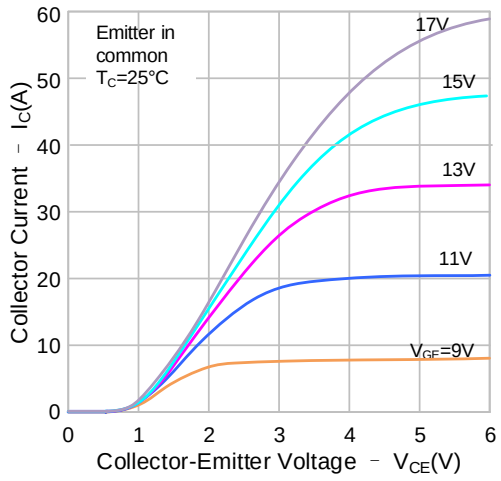


Figure 2. Typical Saturation Voltage Characteristic

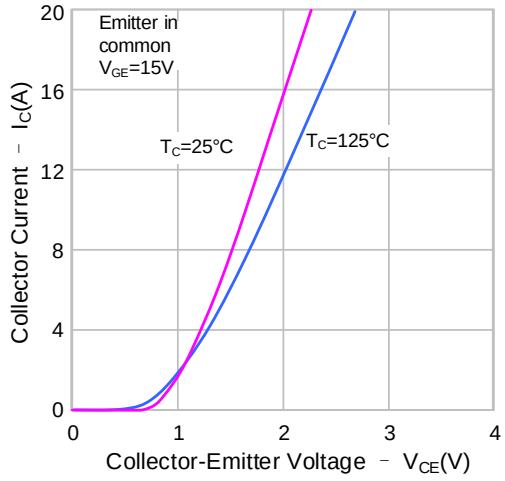


Figure 3. Transfer Characteristic

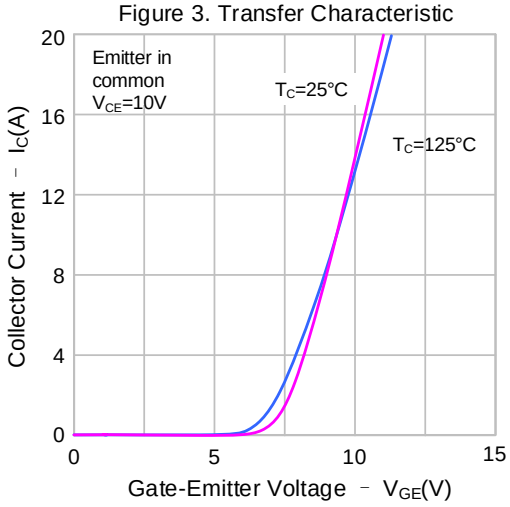


Figure 4. Saturation Voltage vs. V_{GE}

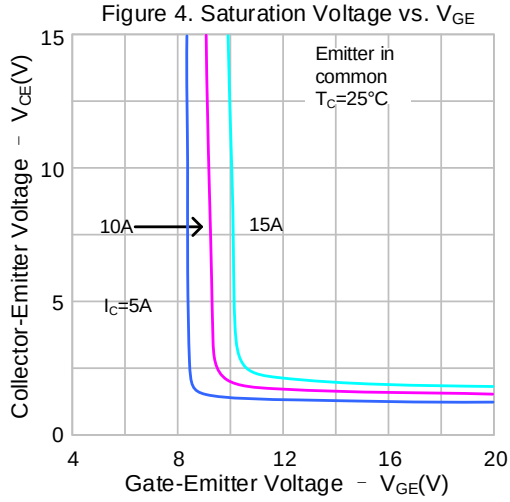


Figure 5. Saturation Voltage vs. V_{GE}

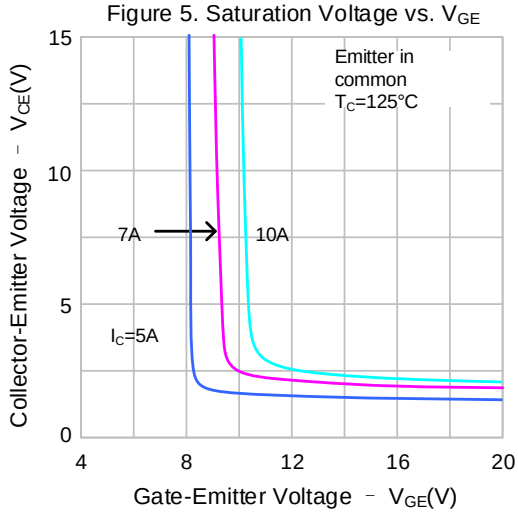
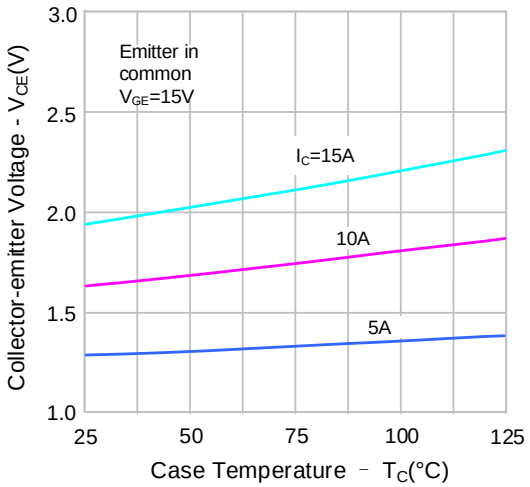


Figure 6. Saturation Voltage Drop vs. Temperature



TYPICAL CHARACTERISTICS CURVE (CONTINUED)

Figure 7. Capacitance Characteristic

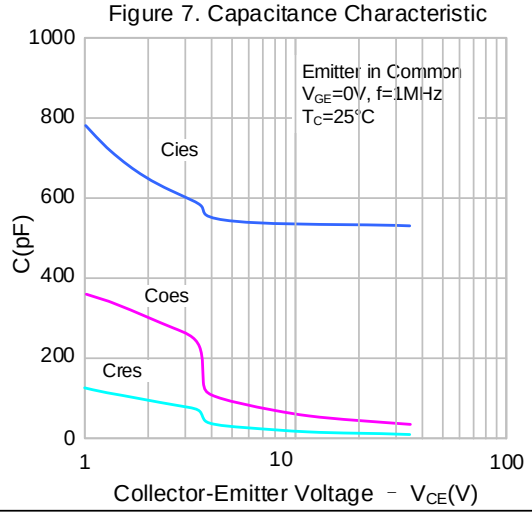


Figure 8. Gate Charge Characteristic

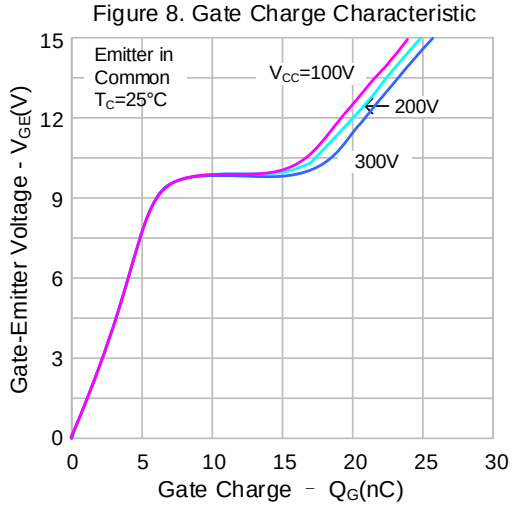


Figure 9. Turn-0n Characteristic vs. Gate Resistance

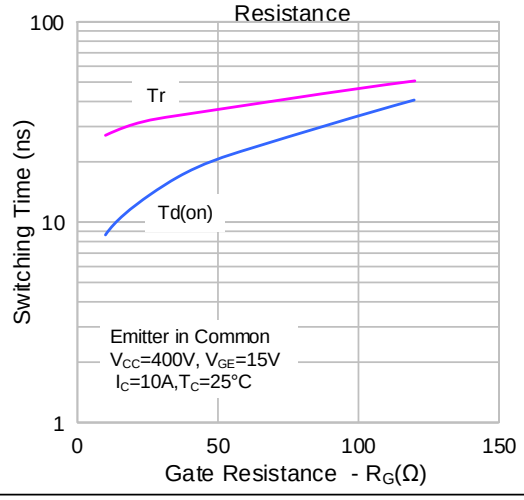


Figure 10. Turn-0ff Characteristic vs. Gate Resistance

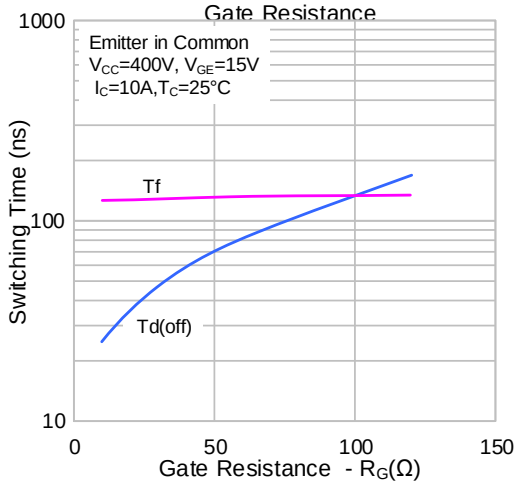


Figure 11. Switching Loss vs. Gate Resistance

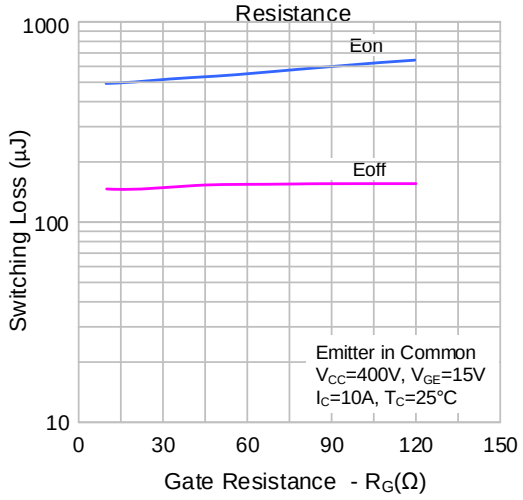
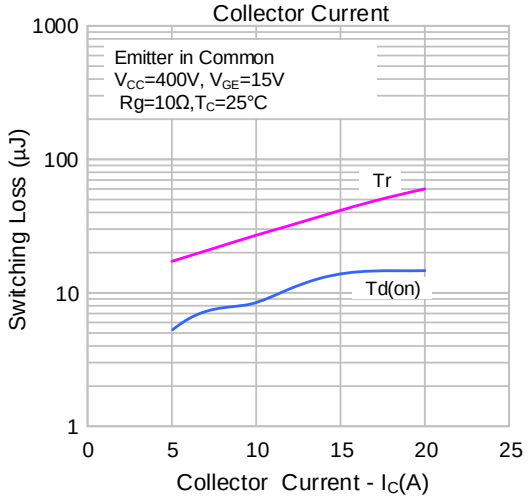


Figure 12. Turn-on Characteristic vs. Collector Current



TYPICAL CHARACTERISTICS CURVE (CONTINUED)

Figure 13. Turn-off Characteristic vs. Collector current

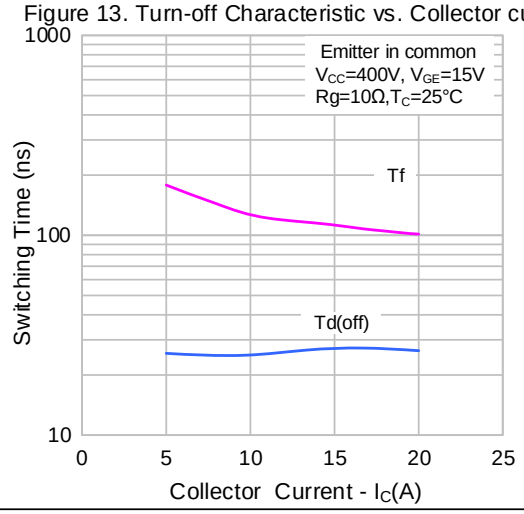


Figure 14. Switching Loss vs. Collector current

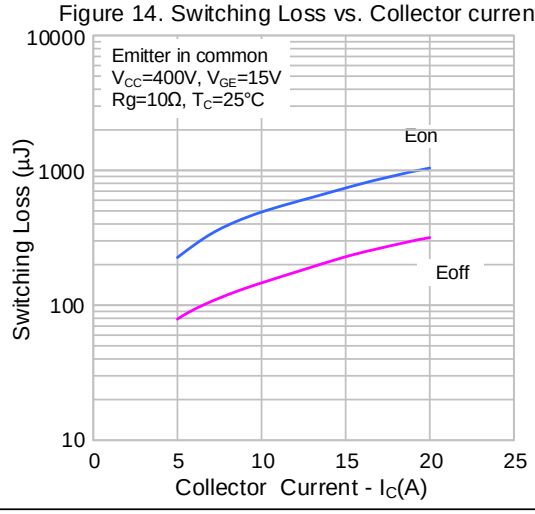


Figure 15. Forward Characteristics

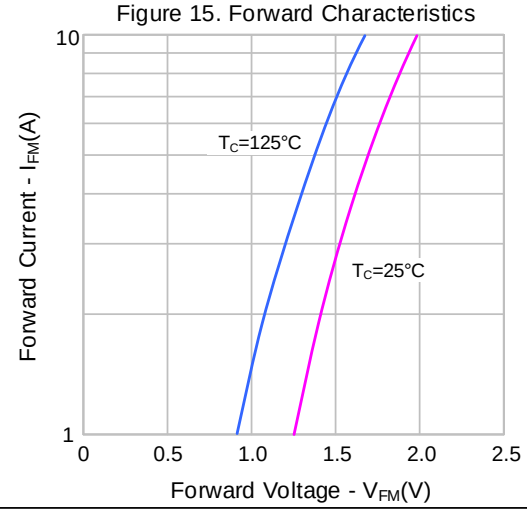


Figure 16. Reverse Recovery Time vs. Forward Current

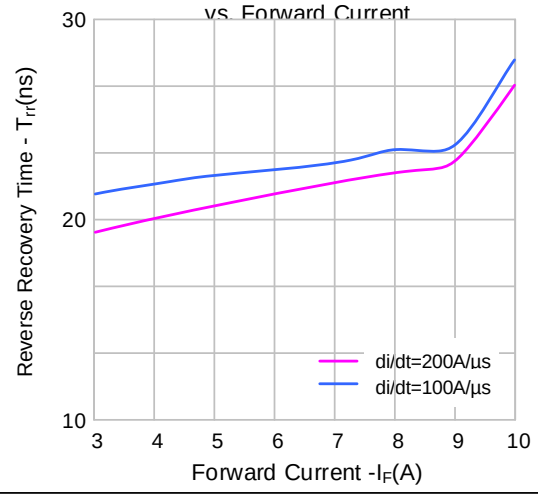


Figure 17. Reverse Recovery Charge vs. Forward Current

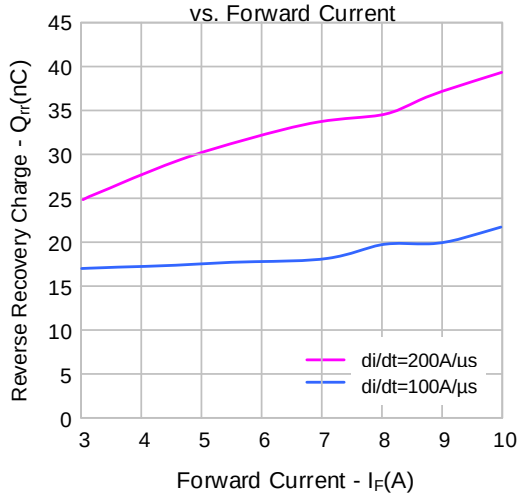
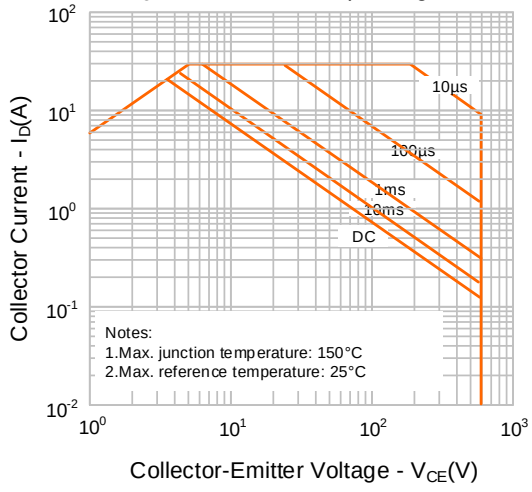


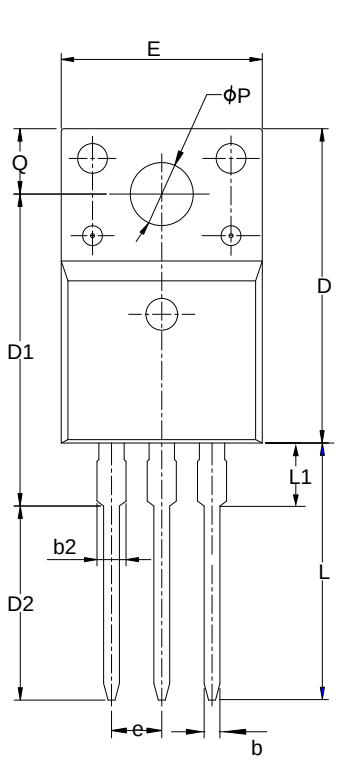
Figure 18. Max. Safe Operating Area

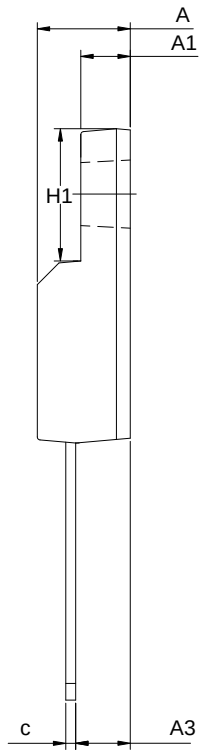


PACKAGE OUTLINE

TO-220F-3L

UNIT: mm

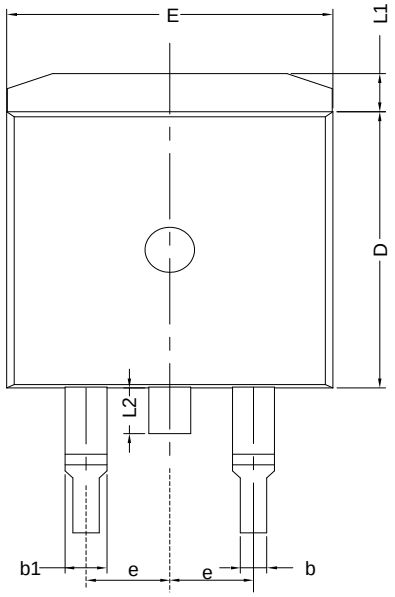


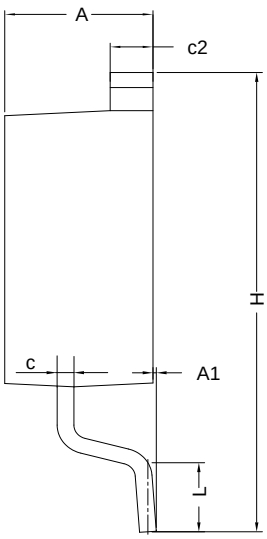


SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.42	4.70	5.02
A1	2.30	2.54	2.80
A3	2.50	2.76	3.10
b	0.70	0.80	0.90
b2	–	–	1.47
c	0.35	0.50	0.65
D	15.25	15.87	16.25
D1	15.30	15.75	16.30
D2	9.30	9.80	10.30
E	9.73	10.16	10.36
e	2.54BSC		
H1	6.40	6.68	7.00
L	12.48	12.98	13.48
L1	–	–	3.50
ϕP	3.00	3.18	3.40
Q	3.05	3.30	3.55

TO-263-2L

UNIT: mm





SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.30	4.57	4.72
A1	0	0.10	0.25
b	0.71	0.81	0.91
b1	1.17	—	1.50
c	0.30	—	0.60
c2	1.17	1.27	1.37
D	8.50	—	9.35
E	9.80	—	10.45
e	2.54BSC		
H	14.70	—	15.75
L	2.00	2.30	2.74
L1	1.12	1.27	1.42
L2	—	—	1.75

MOS DEVICES OPERATE NOTES:

Electrostatic charges may exist in many things. Please take following preventive measures to prevent effectively the MOS electric circuit as a result of the damage which is caused by discharge:

- The operator must put on wrist strap which should be earthed to against electrostatic.
- Equipment cases should be earthed.
- All tools used during assembly, including soldering tools and solder baths, must be earthed.
- MOS devices should be packed in antistatic/conductive containers for transportation.

Important notice :

1. Silan reserves the right to make changes of this instruction without notice.
2. Customers should obtain the latest relevant information when purchasing and should verify whether such information is latest and complete. Please read this instruction and application manual and related materials carefully before using products, including the circuit operation precautions, etc.
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7. Please use and apply product in compliance with all applicable laws and regulations, including but not limited to trade control regulations etc. The product is civil electronic product, please do not use it in non-civil fields.
8. Product promotion is endless, our company will wholeheartedly provide customers with better products!
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Rev.: 1.0

Revision History:

1. First release