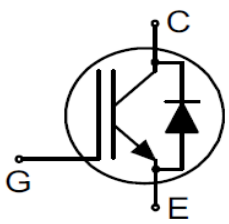
LSH15N135F1 A

FS IGBT 1350V, 15A, 1.75V

Features



• Offers high breakdown voltage to 1350V for improved reliability

• Powerful monolithic body diode with low forward voltage designed for soft commutation only

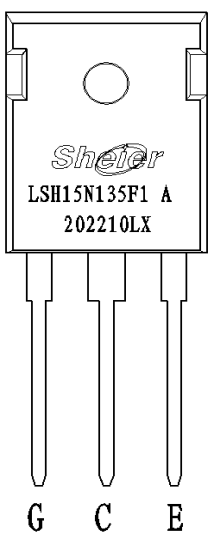
• very tight parameter distribution

• high ruggedness, temperature stable behavior

• low VCEsat

• easy parallel switching capability due to positive temperature coefficient in VCEsat

• Qualified according to JESD-022 for target applications



Applications

• Inductive cooking

• Inverterized microwave ovens

• Resonant converters

• Soft switching applications

Package pin definition

• Pin 1 -- Gate

• Pin 2 & Backside -- Collector

• Pin 3 -- Emmiter

Package Marking and Ordering Information

Part #	V_{ce}	I_c	V_{cesat}, T_{vj}=25°C	T_{vjmax}	Package
LSH15N135F1 A	1350V	15A	1.75V	175	TO-247-3L

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-Emmiter voltage	V_{CE}	1350	V
CD collector current T_C = 25 ℃ T_C = 100 ℃	I_C	 30.0 15.0	A
Pulsed collector current (T_C = 25 ℃, t_p limited by T_{jmax})	$I_{C\ pulse}$	45.0	A
Non repetitive peak collector current [1)]	I_{CSM}	200.0	A
Turn off safe operating area $V_{CE} \leqslant$ 1350V, $T_{vj} \leqslant$ 175 ℃	-	45.0	A
Diode forward current T_C = 25 ℃ T_C = 100 ℃	I_F	 30.0 15.0	A
Diode pulsed current (T_C = 25 ℃, t_p limited by T_{jmax})	$I_{F\ pulse}$	60.0	A
Gate-emitter voltage	V_{GE}	±20	V
Power dissipation Tc = 25 ℃ Power dissipation Tc = 100 ℃	P_{tot}	350 179	W
Operating junction and storage temperature	T_j , T_{stg}	-40...+175	℃
Soldering temperature, wave soldering 1.6mm （0.063in.）form case for 10s		260	℃
Mounting torque,M3 Screw Maximum of mounting porcesses:3	M	0.6	Nm

Thermal Resistance

Parameter	Symbol	Value	Unit
IGBT thermal resistance,junction case. Max	R_{thJC}	0.42	℃/W
Diode thermal resistance,junction case. Max	R_{thJC}	0.42	
Thermal resistance, junction – ambient. Max	R_{thJA}	40	

[1)] capacitor charging saturation current limited by T vjmax < 175 ℃ and t p < 3 μs

Electrical Characteristic (at Tj = 25 ℃, unless otherwise specified)

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Static Characteristic						
Collector-emitter breakdown voltage	$V_{(BR)CES}$	V_{GE} = 0V, I_C = 0.5mA	1350	-	-	V
Collector-emitter saturation voltage	V_{CEsat}	V_{GE} = 15.0V, I_C = 15A				V
		T_{vj} = 25 ℃	-	1.75	1.85	
		T_{vj} = 125 ℃	-	1.79	-	
		T_{vj} = 175 ℃	-	1.90	-	
Diode forward voltage	V_F	V_{GE} = 0V, I_F = 15A				V
		T_{vj} = 25 ℃	-	1.10	1.30	
		T_{vj} = 125 ℃	-	1.05	-	
		T_{vj} = 175 ℃	-	1.00	-	
Gate-emitter threshold voltage	$V_{GE(th)}$	V_{GE} =V_{CE}, I_C = 1mA	4.3	-	6.3	V
Zero gate voltage collector current	I_{CES}	V_{CE} =1350V, V_{GE} = 0V				μA
		T_{vj} = 25 ℃	-	-	100.0	
		T_{vj} = 175 ℃	-	-	800.0	
Gate-emitter leakage current	I_{GES}	V_{CE} = 0V, V_{GE} = 20V	-	-	100.0	nA
Transconductance	g_{fs}	V_{CE} = 20V, I_{CE} = 15A	-	15.0	-	S

Dynamic Characteristic

Input Capacitance	C_{ies}	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz	-	5000	-	pF
Output Capacitance	C_{oes}		-	380	-	
Reverse Transfer Capacitance	C_{res}		-	20	-	
Gate Total Charge	Q_G	V_{CC} = 1080V, I_C = 15A, V_{GE} = 15V	-	175	-	nC
Gate-Source charge	Q_{gs}		-	14	-	
Gate-Drain charge	Q_{gd}		-	110	-	
Turn-off delay time	$t_{d(off)}$	T_{vj} = 25 ℃, V_{CC} = 600V, I_C = 15A, V_{GE} = 0.0/15.0V, R_G= 10.0Ω	-	220	-	ns
Fall time	t_f		-	140	-	
Turn-off energy	E_{off}			0.65		mj

Electrical Characteristic (at Tj = 25 ℃, unless otherwise specified)

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
Turn-off delay time	$t_{d(off)}$	T_{vj} = 175 ℃, V_{CC} = 600V, I_C = 15A, V_{GE} = 0.0/15.0V, R_G= 10.0Ω	-	210	-	ns
Fall time	t_f		-	150	-	
Turn-off energy	E_{off}		-	1.30	-	mj

Typical Performance Characteristics

Figure 1. Safe operating area (D=0,TC=25°C,Tvj=175°C;VGE=15V,tp=1μs

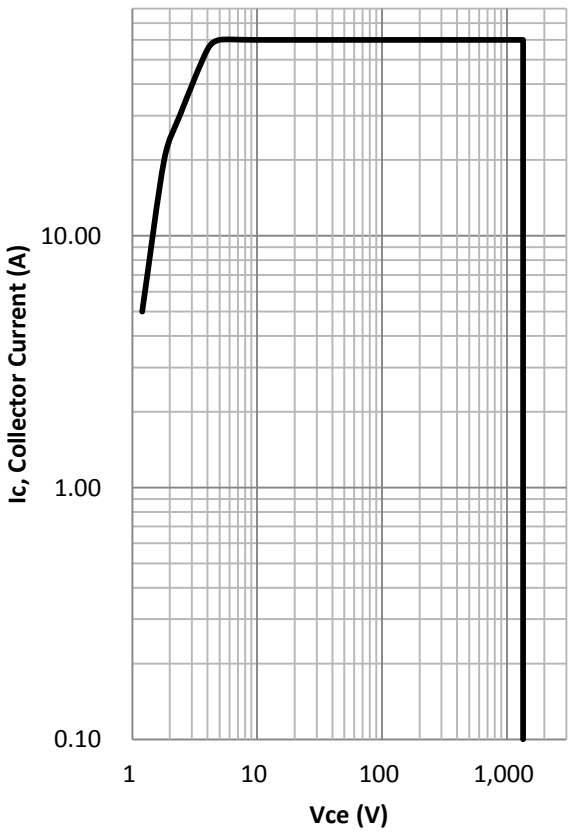


Figure 2. Power dissipation as a function of case temperature (Tvj≤175°C)

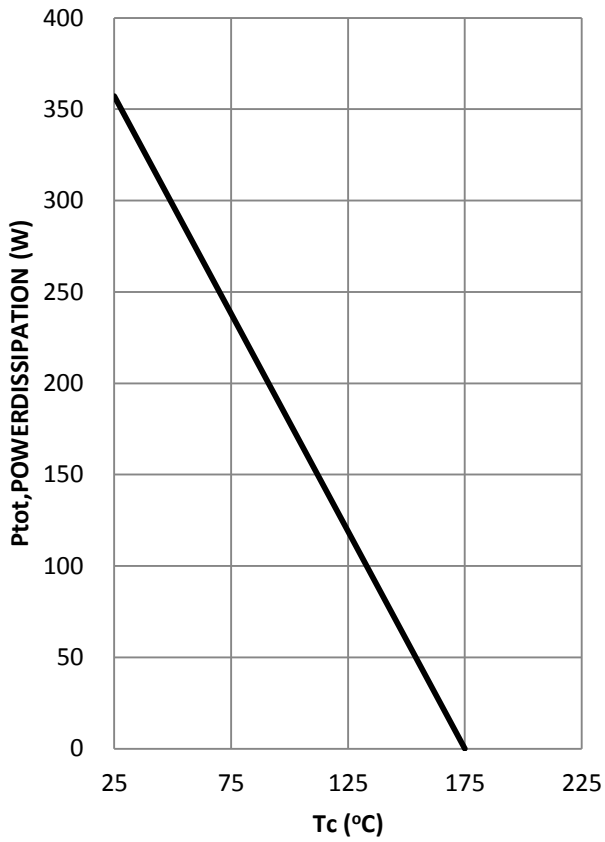


Fig 3: Typical switching time Vs IC Characteristics(Tc=25℃)

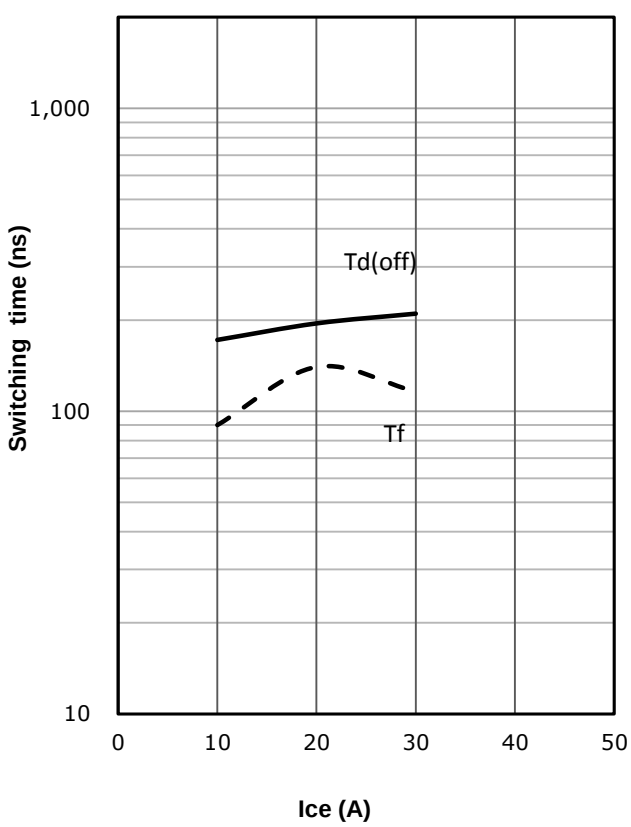


Fig 4：Typical switching Energy Vs IC Characteristics(Tc=25℃)

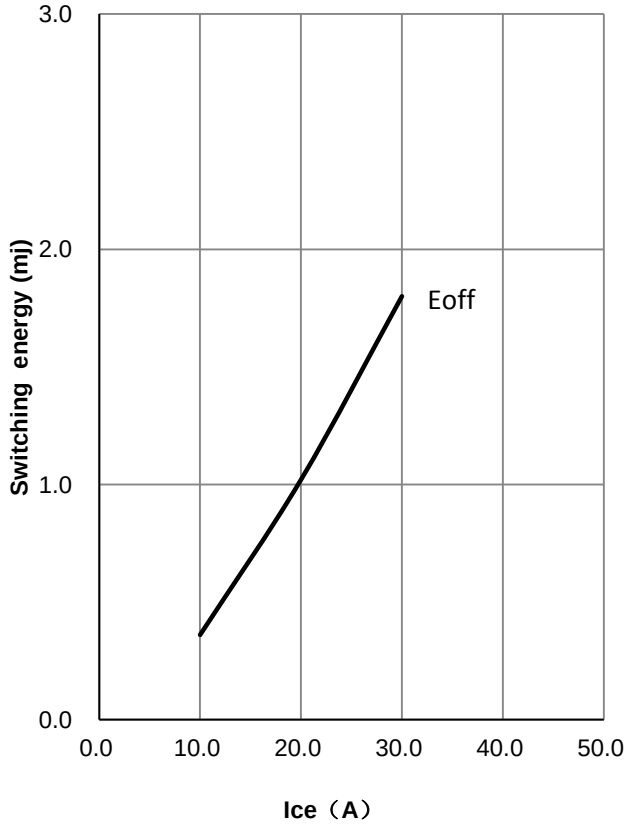


Fig 5: Transfer Characteristics

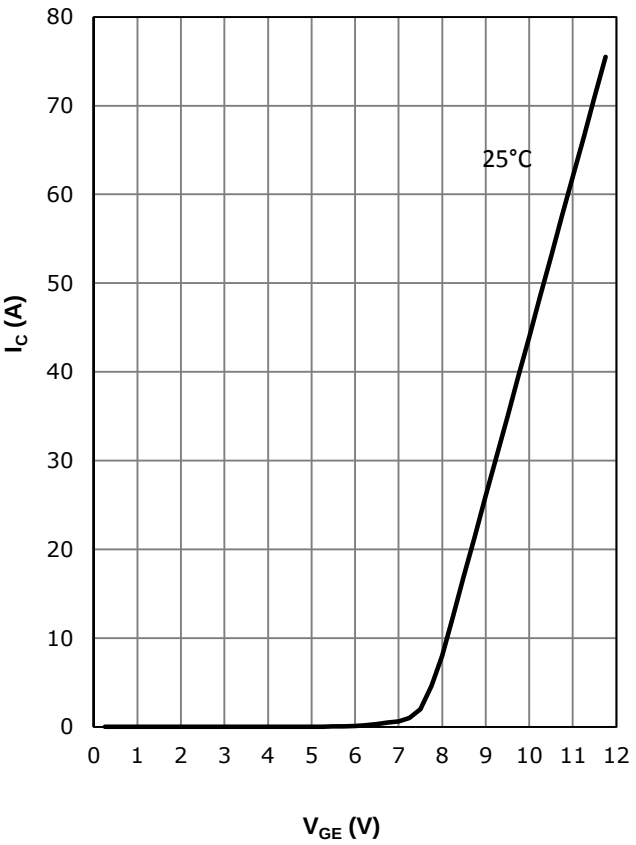


Fig 6: Capacitance Characteristics

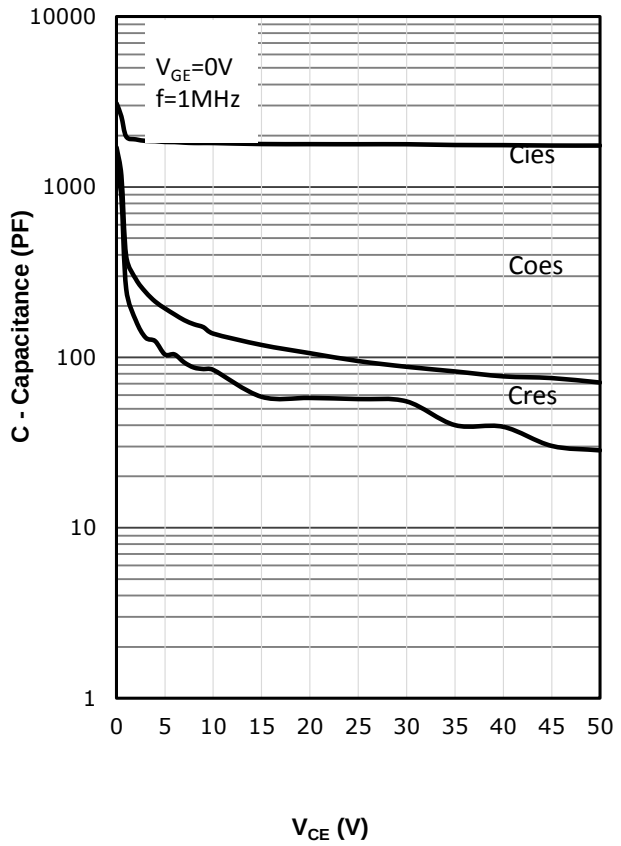


Fig 7: Gate Charge Characteristics

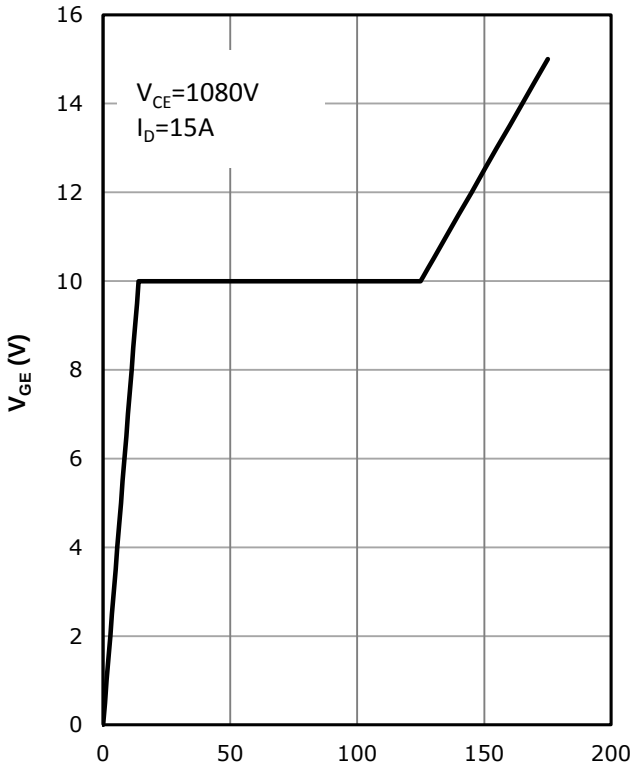
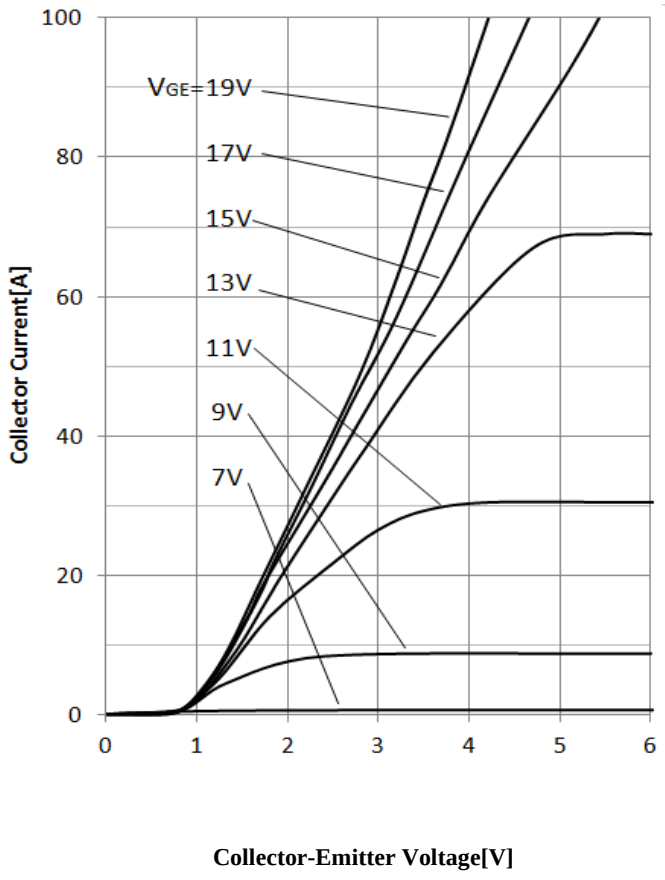
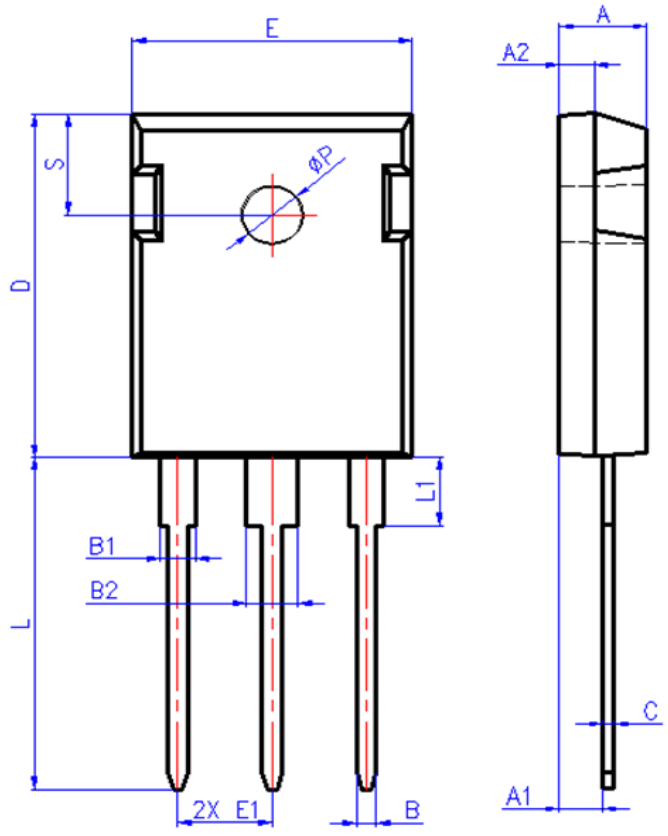


Fig 8. Typical output characteristic(Tc=25℃)



Package Outline: TO-247-3L



Symbol	Dimensions In Millimeters	
	Min.	Max.
A	4.70	5.30
A1	2.30	2.70
A2	1.70	2.30
B	1.00	1.30
B1	1.80	2.20
B2	2.80	3.20
C	0.55	0.75
D	20.70	21.30
E	15.70	16.30
E1	5.15	5.75
L	19.80	20.80
L1	4.00	4.40
S	6.05	6.35
P	3.30	3.80

Revision History

Revison	Date	Major changes
1.0	2021/5/21	Release of formal version

Disclaimer

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Share reserves the right to improve product design, function and reliability without notice.