650V 50A IGBT

■ Applications

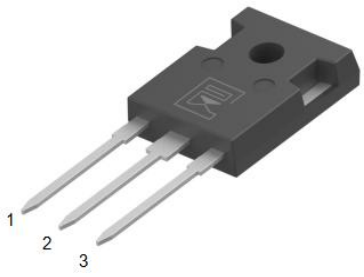
- Industrial UPS
- Welding machine
- Solar converters
- Energy Storage
- Mid to high range switching frequency converters

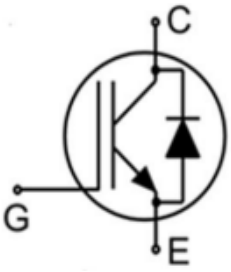
■ Features

- Low switching power loss
- Low switching surge and noise
- Advanced Fieldstop technology
- Qualified according to JEDEC for target applications
- RoHS and Halogen-Free Compliant

■ Product Summary

V_{CES}	650	V
I_C	50	A
$V_{CE(sat),Typ}$@15V	1.65	V





Gate： 1

Collector： 2

Emitter： 3

TO-247L

Marking	Package	Packaging	Min. package quantity
MSLB50N065T5F	TO-247L	Tube	450

■ Absolute Maximum Ratings（Tc=25℃ unless otherwise noted)

Parameter	Symbol	Ratings	Unit
Collector-emitter Voltage	V_{CES}	650	V
DC collector current，limited by T_{jmax} TC=25℃ TC=100℃	I_C	 100 50	A
Pulsed collector current，tp limited by T_{jmax}	$I_{C\ Pulse}$	150	A
Diode forward current，limited by T_{jmax} TC=25℃ TC=100℃	I_F	 100 50	A
Diode Pulsed current，tp limited by T_{jmax}	$I_{F\ Pulse}$	150	A
Continuous Gate-emitter voltage	V_{GE}	±20	V
Power Dissipation （TC=25℃）	P_D	273	W
Junction Temperature	T_j	175	℃
Storage Temperature	T_{STG}	-55-175	℃

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

■ Thermal Characteristics

Parameter	Symbol	Max	Unit
IGBT Maximum Junction-to-Case	$R_{\theta JC}$	0.55	℃/W
Diode Maximum Junction-to-Case	$R_{\theta JC}$	1	℃/W
Maximum Junction-to-Ambient	$R_{\theta JA}$	40	℃/W

Note：This transistor is sensitive to electrostatic discharge and should be handled with care.

■ Electrical Characteristics（Tc=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
Static Characteristics							
Collector-emitter Breakdown Voltage	BV_{CES}	V_{GE}=0V,I_C=0.5mA		650	-	-	V
Zero gate voltage collector current	I_{CES}	V_{CE}=650V,V_{GE}=0V		-	-	1	uA
Gate-emitter leakage current	I_{GES}	V_{GE}=±20V,V_{CE}=0V		-	-	±500	nA
Gate-emitter threshold voltage	$V_{GE(TH)}$	V_{CE}=V_{GE},I_C=250uA		3	3.9	5	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE}=15V,I_C=50A		-	1.65	2.3	V
			Tj=175°C	-	2	-	V
Diode forward voltage	V_F	I_F=50A		-	1.8	2.1	V
			Tj=150°C	-	1.3	-	V
Dynamic Characteristics							
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE}=0V, f=1.0MHz		-	3470	-	pF
Output Capacitance	C_{oes}			-	130	-	pF
Reverse Transfer Capacitance	C_{res}			-	12	-	pF
Integrated gate resistor	R_{Gint}			-	1	-	Ω
Total Gate Charge	Q_g	V_{CC}=480V,I_C=50A, V_{GE}=15V		-	130	-	nC
Gate−to−emitter charge	Q_{ge}			-	30	-	nC
Gate−to−collector charge	Q_{gc}			-	32	-	nC
Internal emitter inductance measured 5mm (0.197 in.) from case	L_E			-	13	-	nH

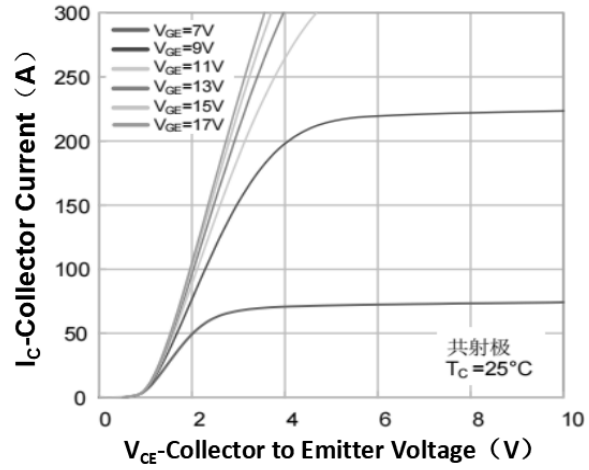
■ Switching Characteristic, Inductive Load, at T_j=25℃

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
IGBT Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	VCC= 400V IC= 50A VGE= 15V RG= 10Ω Inductive load	-	20	-	ns
Turn-On Rise Time	t_r		-	59	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	130	-	ns
Turn-Off Fall Time	t_f		-	45	-	ns
Turn-on energy	E_{on}		-	1.5	-	mJ
Turn-off energy	E_{off}		-	0.65	-	mJ
Diode Characteristics						
Reverse Recovery Time	t_{rr}	V_R=400V,I_F=30A, di/dt=200A/us	-	50	-	ns
Reverse Recovery Charge	Q_{rr}		-	0.18	-	uC
Peak Reverse Recovery Current	I_{rrm}		-	7.3	-	A

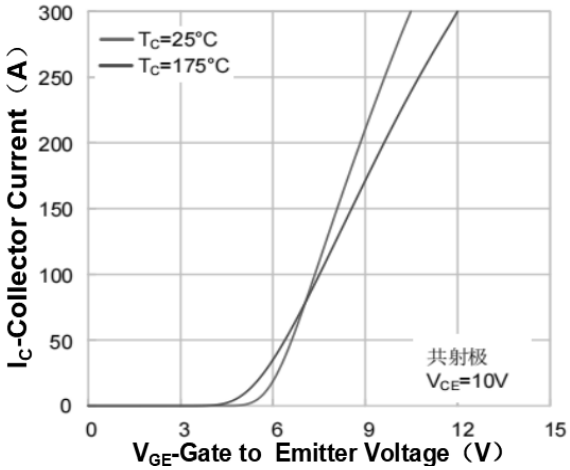
■ Switching Characteristic, Inductive Load, at T_j=175℃

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
IGBT Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	VCC= 400V IC= 50A VGE= 15V RG= 10Ω Inductive load	-	22	-	ns
Turn-On Rise Time	t_r		-	58	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	160	-	ns
Turn-Off Fall Time	t_f		-	41	-	ns
Turn-on energy	E_{on}		-	1.62	-	mJ
Turn-off energy	E_{off}		-	0.8	-	mJ
Diode Characteristics						
Reverse Recovery Time	t_{rr}	V_R=400V,I_F=30A, di/dt=200A/us	-	84	-	ns
Reverse Recovery Charge	Q_{rr}		-	0.45	-	uC
Peak Reverse Recovery Current	I_{rrm}		-	10.8	-	A

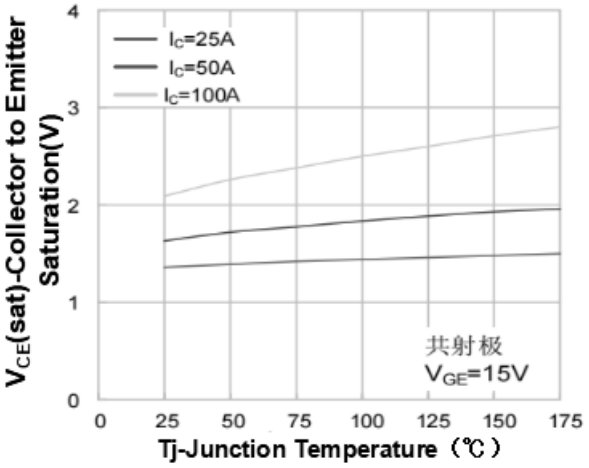
■ Characteristics Curves



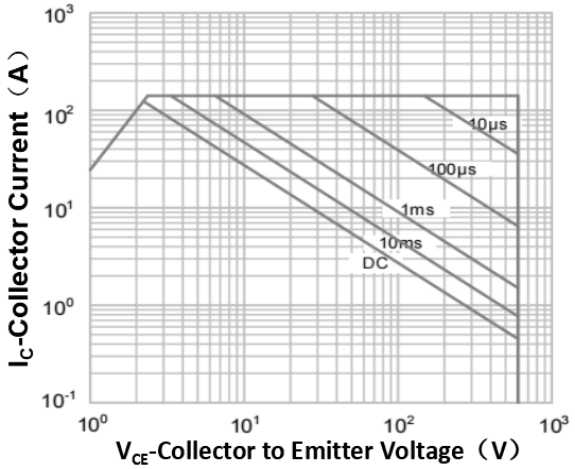
Output Characteritsics



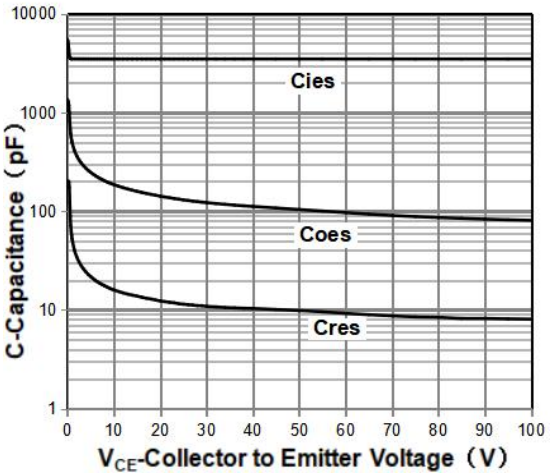
Transfer Characteritsics



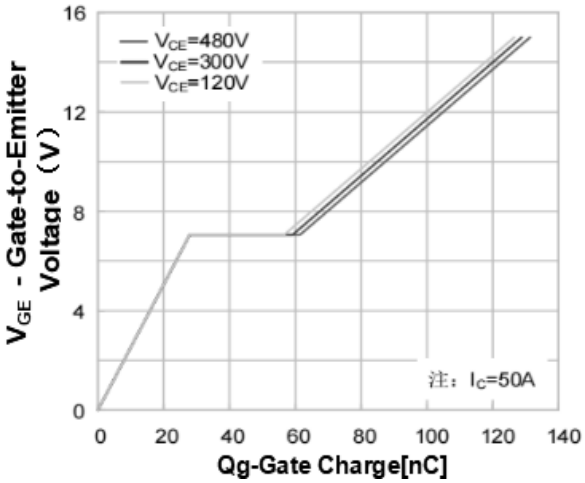
Typical collector-emitter saturation voltage as a function of junction temperature (V_{GE}=15V)



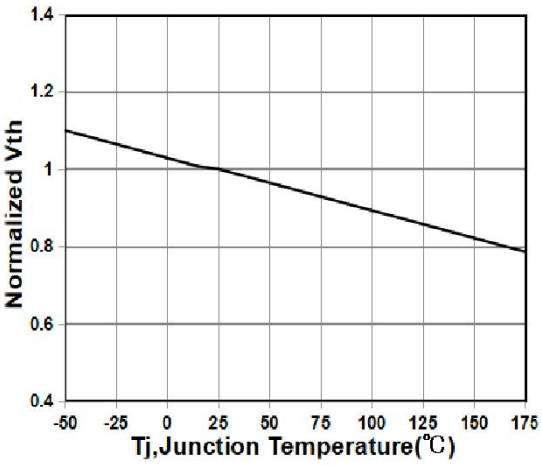
Maximum Safe Operating Area



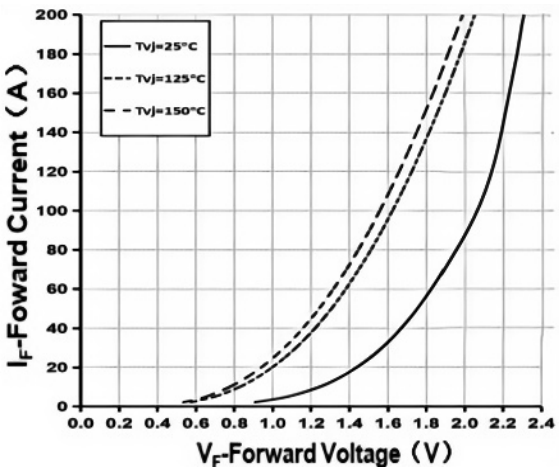
Capacitance



Typical gate charge



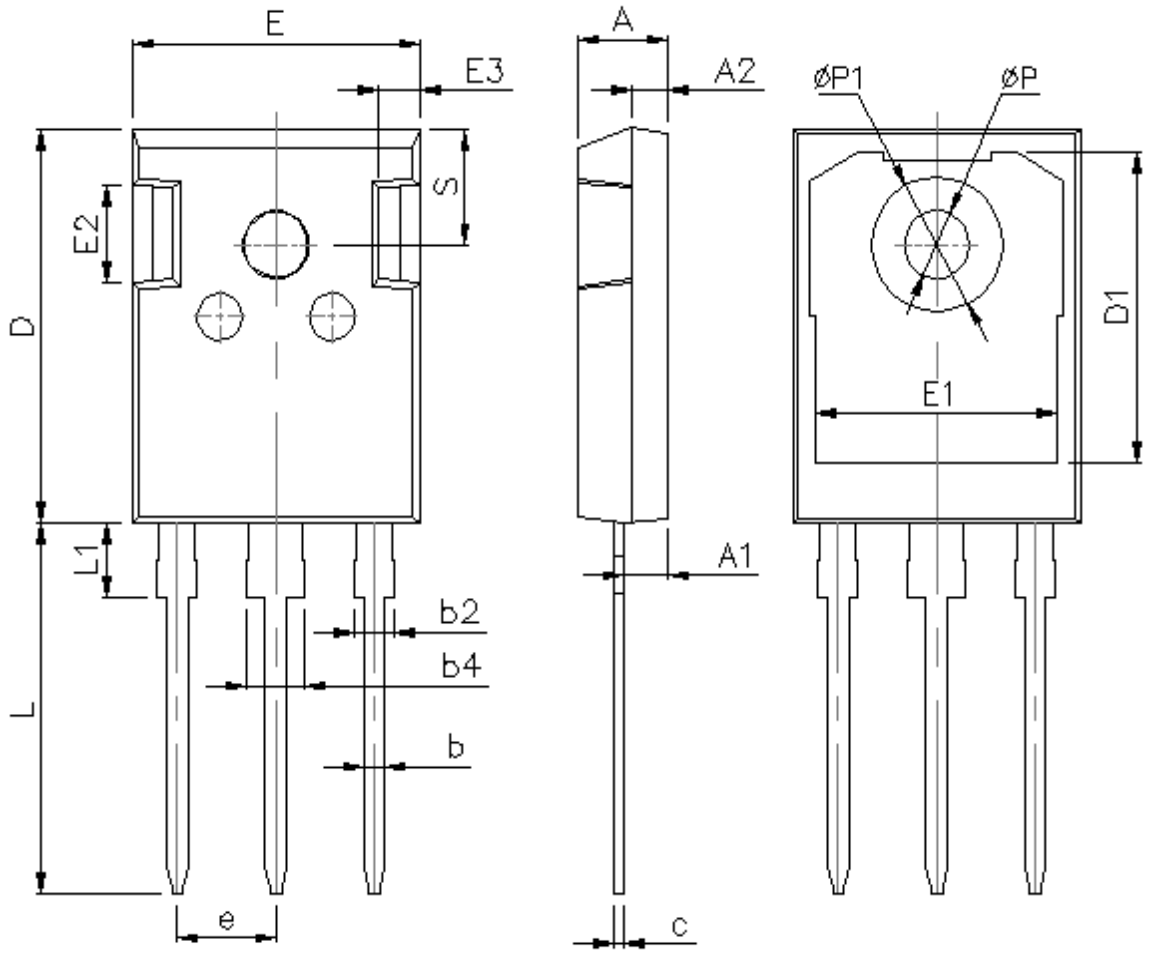
Gate-emitter threshold voltage as a function of junction temperature



Typ. diode forward current as a function of forward voltage

Note： The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

■ TO-247L Package Dimensions

Unit：mm

Symbol	Min	Nom	Max	Symbol	Min	Nom	Max
A	4.80		5.20	E1	13.00		13.60
A1	2.20	2.40	2.60	E2	5.00		5.50
A2	1.85		2.15	E3	1.90		2.60
b	1.07		1.33	e		5.44	
b2	1.90		2.16	L	19.30		19.90
b4	2.90		3.20	L1	3.75	3.95	4.15
c	0.52		0.68	ΦP	3.40		3.80
D	20.70		21.30	ΦP1	7.00		7.40
D1	16.15		16.95	S	6.04	6.15	6.30
E	15.50		16.10