

■ Applications

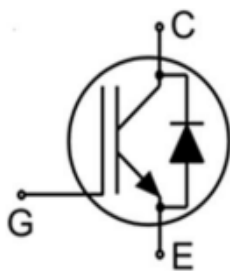
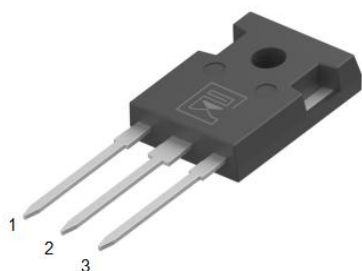
- Industrial UPS
- Welding machine
- Solar converters
- Energy Storage
- Mid to high range switching frequency converters

■ 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



TO-247L

Gate: 1
Collector: 2
Emitter: 3

Marking	Package	Packaging	Min. package quantity
MSLB50N065T5H	TO-247L	Tube	450



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

Parameter	Symbol	Ratings	Unit
Collector-emitter Voltage	V_{CES}	650	V
DC collector current, limited by T_{jmax} TC=25°C TC=100°C	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°C TC=100°C	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°C)	P_D	273	W
Junction Temperature	T_J	175	°C
Storage Temperature	T_{STG}	-55-175	°C

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	°C/W
Diode Maximum Junction-to-Case	$R_{\theta JC}$	1	°C/W
Maximum Junction-to-Ambient	$R_{\theta JA}$	40	°C/W

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



■ Electrical Characteristics (Tc=25°C 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	-
Diode forward voltage	V _F	I _F =50A	-	2.1	2.5	V
			Tj=150°C	-	1.6	-
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 $T_j=25^{\circ}\text{C}$

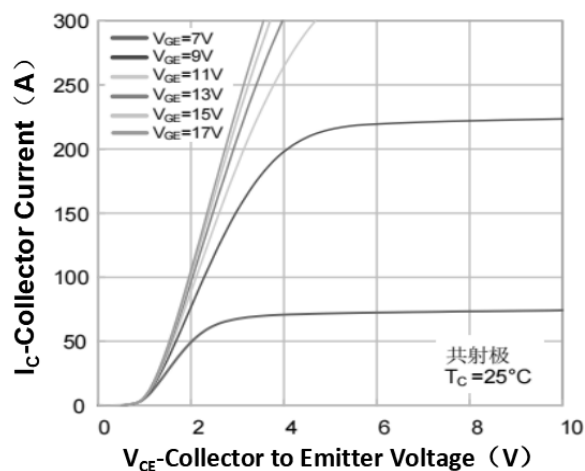
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
IGBT Switching Characteristics						
Turn-On Delay Time	t _{d(on)}	VCC= 400V IC= 50A VGE= 15V RG= 10Ω Inductive load	-	20	-	ns
Turn-On Rise Time	t _r		-	59	-	ns
Turn-Off Delay Time	t _{d(off)}		-	130	-	ns
Turn-Off Fall Time	t _f		-	45	-	ns
Turn-on energy	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	-	40	-	ns
Reverse Recovery Charge	Q _{rr}		-	0.11	-	uC
Peak Reverse Recovery Current	I _{rrm}		-	5.6	-	A

■ Switching Characteristic, Inductive Load, at $T_j=175^{\circ}\text{C}$

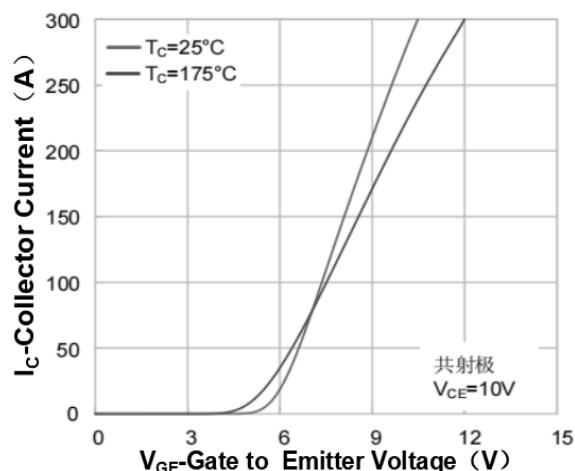
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
IGBT Switching Characteristics						
Turn-On Delay Time	t _{d(on)}	VCC= 400V IC= 50A VGE= 15V RG= 10Ω Inductive load	-	22	-	ns
Turn-On Rise Time	t _r		-	58	-	ns
Turn-Off Delay Time	t _{d(off)}		-	160	-	ns
Turn-Off Fall Time	t _f		-	41	-	ns
Turn-on energy	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	-	76	-	ns
Reverse Recovery Charge	Q _{rr}		-	0.33	-	uC
Peak Reverse Recovery Current	I _{rrm}		-	8.6	-	A



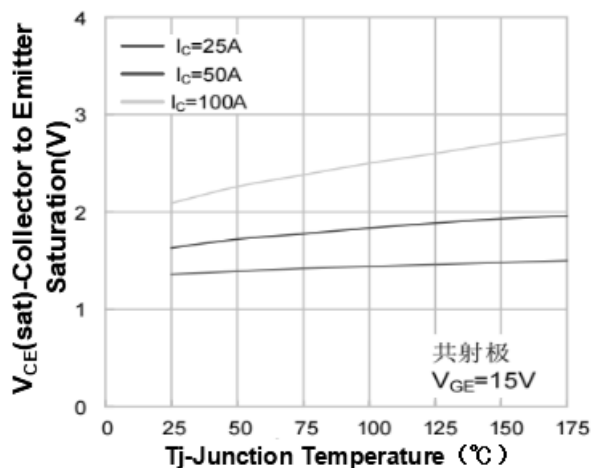
■ Characteristics Curves



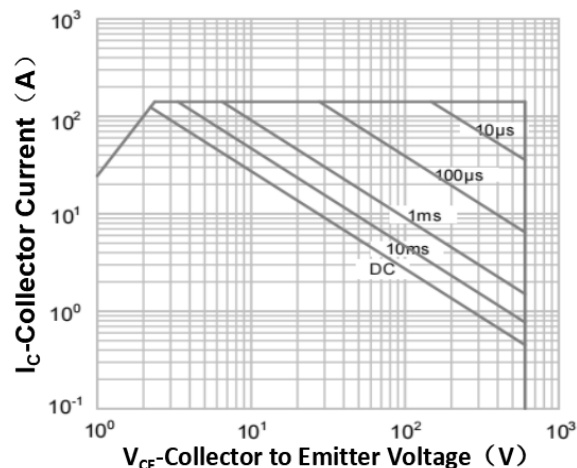
Output Characterisitics



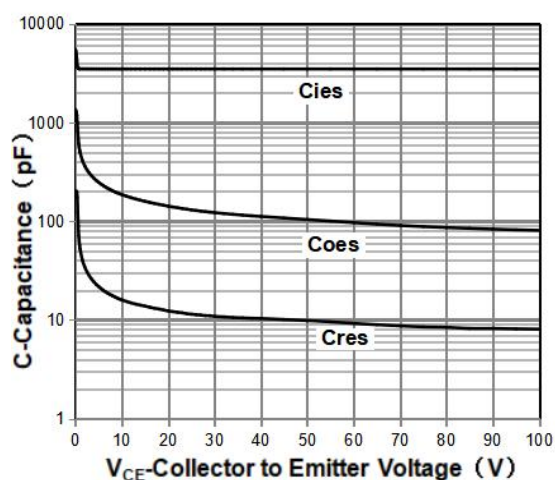
Transfer Characterisitics



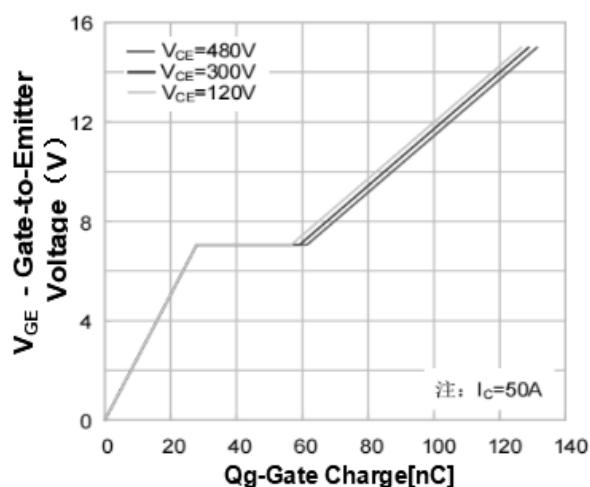
Typical collector-emitter saturation voltage as a function of junction temperature ($V_{GE}=15\text{V}$)



Maximum Safe Operating Area

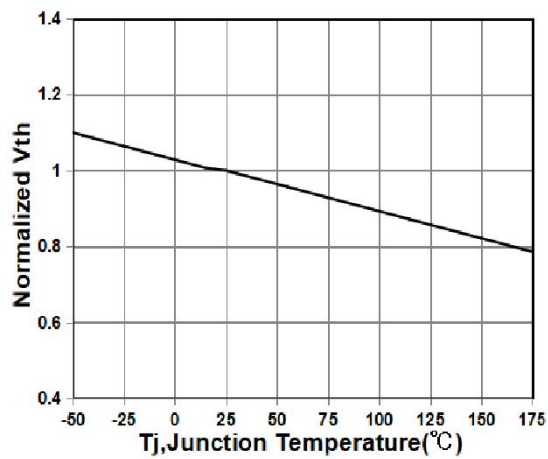


Capacitance

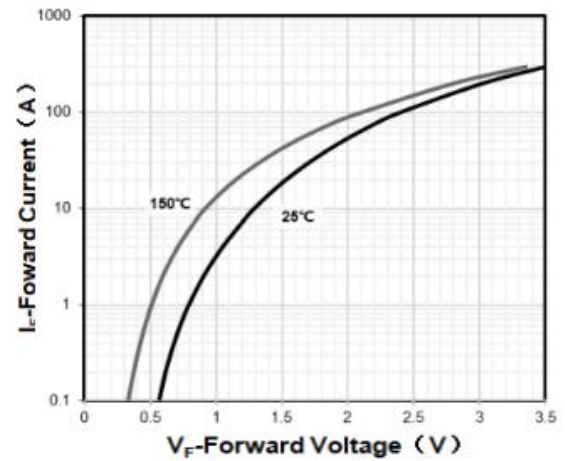


Typical gate charge





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				

