



■ Applications

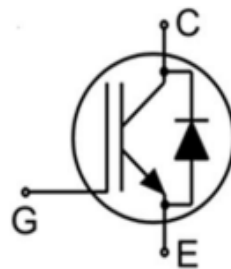
- Inverter
- Welding converters
- Power Factor Correction (PFC)
- Uninterruptible Power Supply (UPS)
- Converters with high switching frequency

■ Features

- Low $V_{CE(sat)}$
- High ruggedness, temperature stable
- Positive temperature coefficient in $V_{CE(sat)}$
- Enhanced avalanche capability
- RoHS and Halogen-Free Compliant

■ Product Summary

V_{CES}	650	V
I_C	30	A
$V_{CE(sat)}, Typ@15V$	1.35	V



TO-247L

Gate: 1
Collector: 2
Emitter: 3

Marking	Package	Packaging	Min. package quantity
MSLB40N065J2C	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	60 30	A
Pulsed collector current, tp limited by T_{jmax}	$I_{C\ Pulse}$	120	A
Diode forward current, limited by T_{jmax} TC=25°C TC=100°C	I_F	60 30	A
Diode Pulsed current, tp limited by T_{jmax}	$I_{F\ Pulse}$	120	A
Continuous Gate-emitter voltage	V_{GE}	±20	V
Power Dissipation (TC=25°C)	P_D	192	W
Junction Temperature	T_J	175	°C
Storage Temperature	T_{STG}	-55-150	°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	$R_{\theta JC}$	0.78	°C/W
Diode Maximum Junction-to-Case	$R_{\theta JC}$	1.2	°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 =250uA		650	-	-	V
Zero gate voltage collector current	I _{CES}	V _{CE} =650V, V _{GE} =0V		-	-	20	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		4	5.3	6	V
Collector-emitter saturation voltage	V _{CE(sat)}	V _{GE} =15V, I _C =30A		-	1.35	1.7	V
			Tj=150°C	-	1.5	-	V
Diode forward voltage	V _F	I _F =30A		-	1.4	1.7	V
			Tj=175°C	-	1	-	V
Dynamic Characteristics							
Input Capacitance	C _{ies}	V _{CE} =25V, V _{GE} =0V, f=1.0MHz		-	1670	-	pF
Output Capacitance	C _{oes}			-	110	-	pF
Reverse Transfer Capacitance	C _{res}			-	33	-	pF
Integrated gate resistor	R _{Gint}			-	6.7	-	Ω
Total Gate Charge	Q _g	V _{CC} =400V, I _C =25A, V _{GE} =15V		-	68	-	nC
Gate-to-emitter charge	Q _{ge}			-	9.3	-	nC
Gate-to-collector charge	Q _{gc}			-	26	-	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	$t_{d(on)}$	$V_{CC}=400V, I_C=30A,$ $V_{GE}=0/15V, R_g=10\Omega$ Inductive load	-	22	-	ns
Turn-On Rise Time	t_r		-	23	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	88	-	ns
Turn-Off Fall Time	t_f		-	115	-	ns
Turn-on energy	E_{on}		-	0.78	-	mJ
Turn-off energy	E_{off}		-	0.43	-	mJ
Body Diode Characteristics						
Reverse Recovery Time	t_{rr}	$V_R=400V, I_F=20A,$ $di/dt=200A/us$	-	102	-	ns
Reverse Recovery Charge	Q_{rr}		-	0.45	-	μC
Peak Reverse Recovery Current	I_{rrm}		-	8.9	-	A

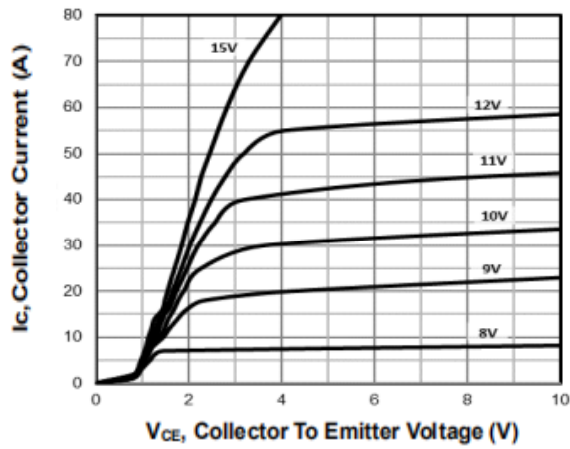
■ Switching Characteristic, Inductive Load, at $T_J=150^{\circ}\text{C}$

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
IGBT Switching Characteristics						
Turn-On Delay Time	t _{d(on)}	V _{CC} =400V,I _C =30A, V _{GE} =0/15V,R _g =10Ω Inductive load	-	23	-	ns
Turn-On Rise Time	t _r		-	25	-	ns
Turn-Off Delay Time	t _{d(off)}		-	90	-	ns
Turn-Off Fall Time	t _f		-	120	-	ns
Turn-on energy	E _{on}		-	0.88	-	mJ
Turn-off energy	E _{off}		-	0.65	-	mJ
Body Diode Characteristics						
Reverse Recovery Time	t _{rr}	V _R =400V,I _F =20A, di/dt=200A/us	-	164	-	ns
Reverse Recovery Charge	Q _{rr}		-	1.1	-	μC
Peak Reverse Recovery Current	I _{rrm}		-	13	-	A

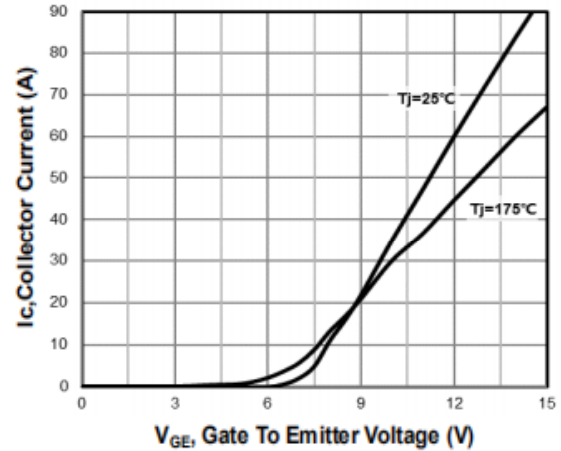




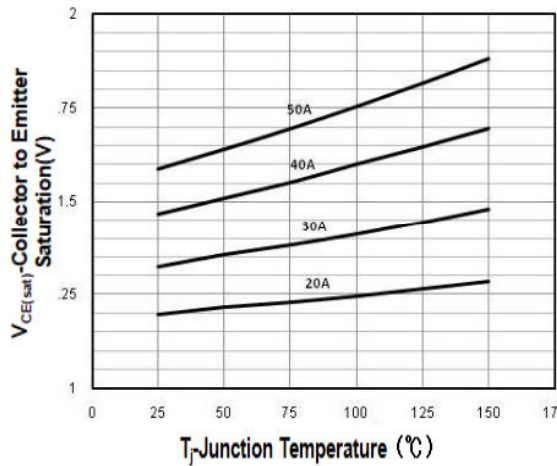
■ Characteristics Curves



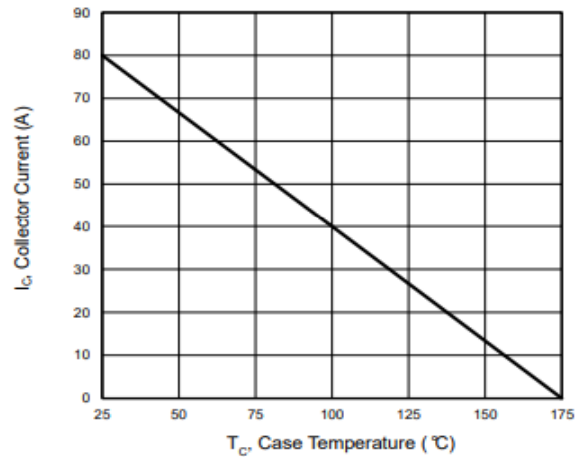
Output Characterisitcs



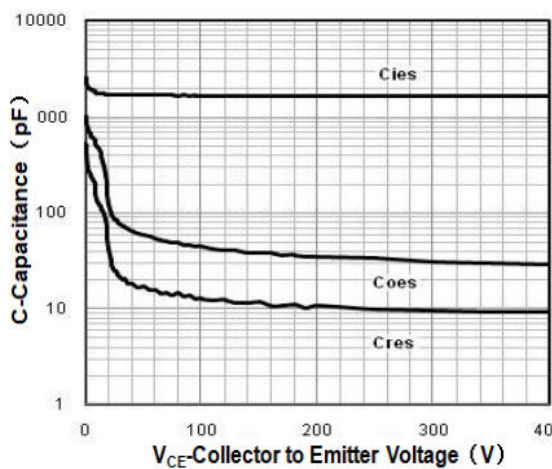
Transfer Characterisitcs ($V_{CE}=15\text{V}$)



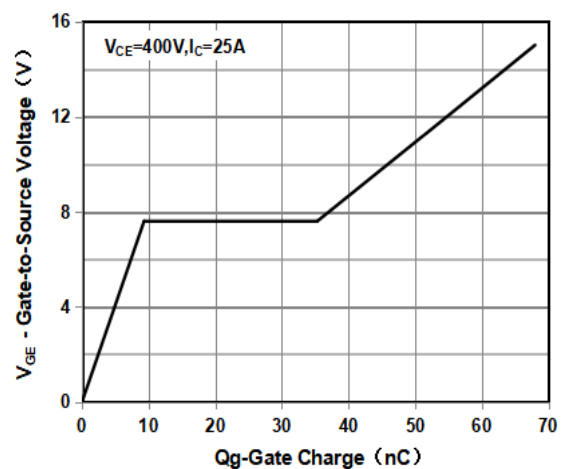
Typical collector-emitter saturation voltage as a function of junction temperature ($V_{GE} = 15\text{V}$)



Collector current as a function of Case temperature

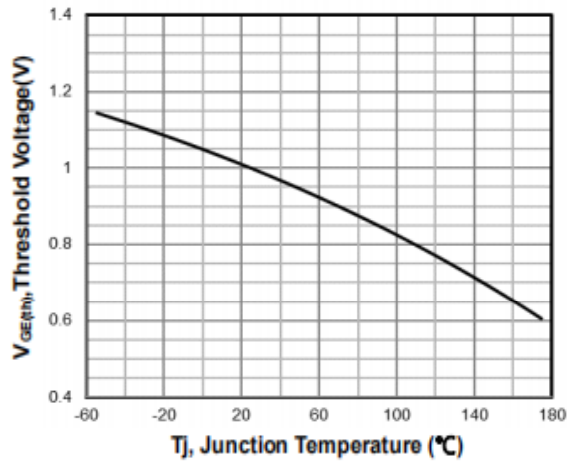


Capacitance

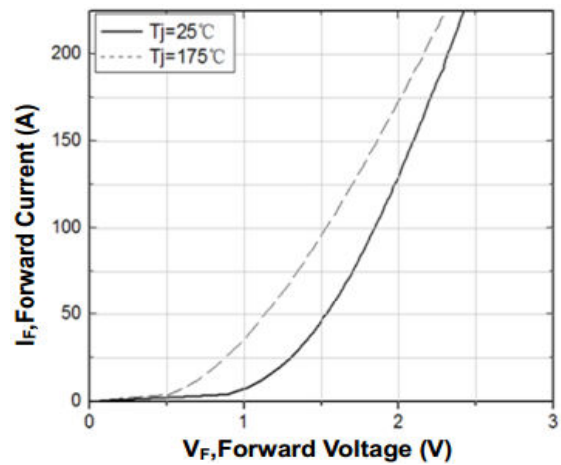


Typical gate charge





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				

