

Applications

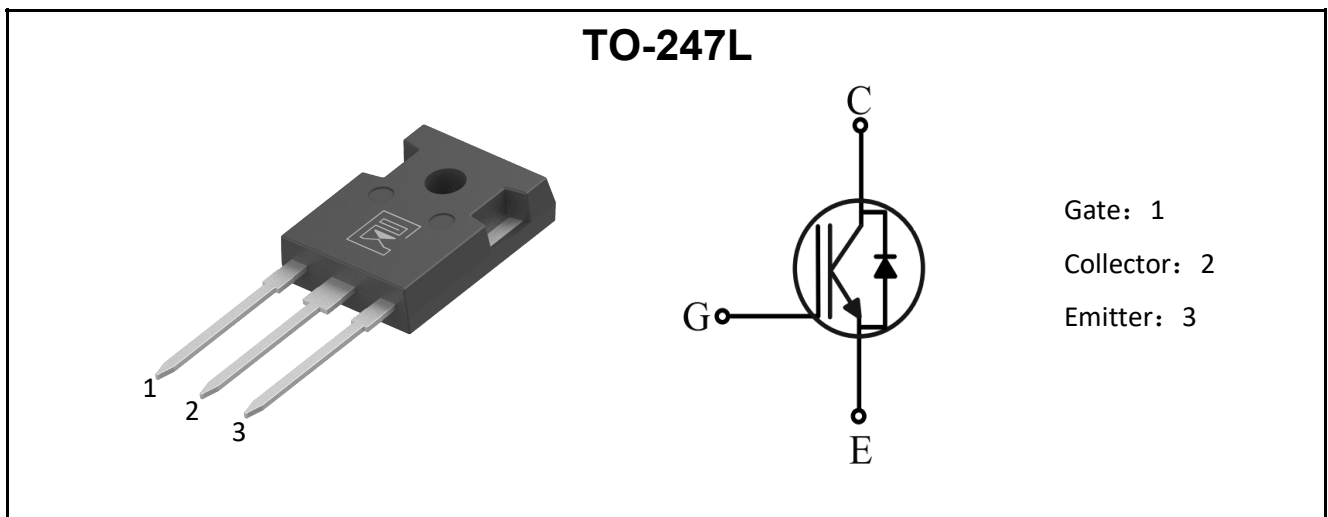
- Inverter
- Welding converters
- Power Factor Correction (PFC)
- Uninterruptible Power Supply (UPS)
- Converters with high switching frequency

Features

- Low $V_{CE(sat)}$
- High speed switching
- High ruggedness, temperature stable
- Positive temperature coefficient in $V_{CE(sat)}$
- Enhanced avalanche capability

Product Summary

V_{CES}	650	V
I_C	40	A
$V_{CE(sat)}, Typ @ 15V$	1.5	V



Package Marking and Ordering Information

Ordering code	Marking	Package	Packaging	Min. package quantity
MSLB40N065J2F	MSLB40N065J2F	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 40	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 40	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	°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}	$V_{GE}=0V, I_C=250\mu A$	650	-	-	V
Zero gate voltage collector current	I_{CES}	$V_{CE}=650V, V_{GE}=0V$	-	-	20	μA
Gate-emitter leakage current	I_{GES}	$V_{GE}=\pm 20V, V_{CE}=0V$	-	-	± 500	nA
Gate-emitter threshold voltage	$V_{GE(TH)}$	$V_{CE}=V_{GE}, I_C=250\mu A$	4.0	5.3	6.0	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=40A$	-	1.5	1.8	V
			$T_J=150^{\circ}C$	-	1.7	-
Diode forward voltage	V_F	$I_F=40A$	-	2	2.4	V
			$T_J=150^{\circ}C$	-	1.5	-
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	$V_{CC}=400V, I_C=25A, V_{GE}=15V$	-	69	-	nC
Gate-to-emitter charge	Q_{ge}		-	9.4	-	nC
Gate-to-collector charge	Q_{gc}		-	25	-	nC
Internal emitter inductance measured 5mm (0.197 in.) from case	L_E		-	13	-	nH

Switching Characteristic, Inductive Load, at $T_j=25^{\circ}\text{C}$

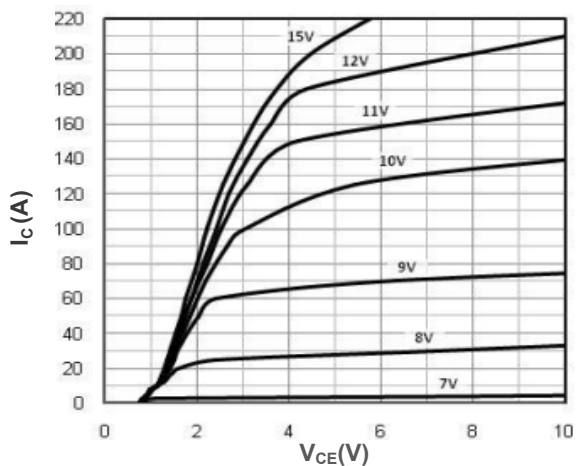
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
IGBT Switching Characteristics						
Turn-On Delay Time	t _{d(on)}	V _{CC} = 400V I _C = 40A V _{GE} = 0/15V R _G = 10Ω Inductive load	-	27	-	ns
Turn-On Rise Time	t _r		-	26	-	ns
Turn-Off Delay Time	t _{d(off)}		-	98	-	ns
Turn-Off Fall Time	t _f		-	126	-	ns
Turn-on energy	E _{on}		-	0.91	-	mJ
Turn-off energy	E _{off}		-	0.58	-	mJ
Diode Characteristics						
Reverse Recovery Time	t _{rr}	V _R =400V,I _F =20A, di/dt=200A/us	-	45	-	ns
Reverse Recovery Charge	Q _{rr}		-	0.15	-	uC
Peak Reverse Recovery Current	I _{rrm}		-	6.5	-	A

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

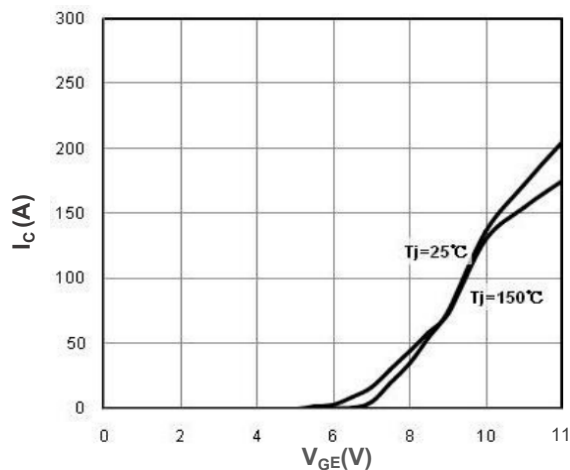
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
IGBT Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	$V_{CC}= 400V$ $I_C= 40A$ $V_{GE}= 0/15V$ $R_G= 10\Omega$ Inductive load	-	29	-	ns
Turn-On Rise Time	t_r		-	27	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	91	-	ns
Turn-Off Fall Time	t_f		-	156	-	ns
Turn-on energy	E_{on}		-	1.02	-	mJ
Turn-off energy	E_{off}		-	0.86	-	mJ
Diode Characteristics						
Reverse Recovery Time	t_{rr}	$V_R=400V, I_F=20A,$ $di/dt=200A/us$	-	85	-	ns
Reverse Recovery Charge	Q_{rr}		-	0.5	-	uC
Peak Reverse Recovery Current	I_{rrm}		-	12	-	A



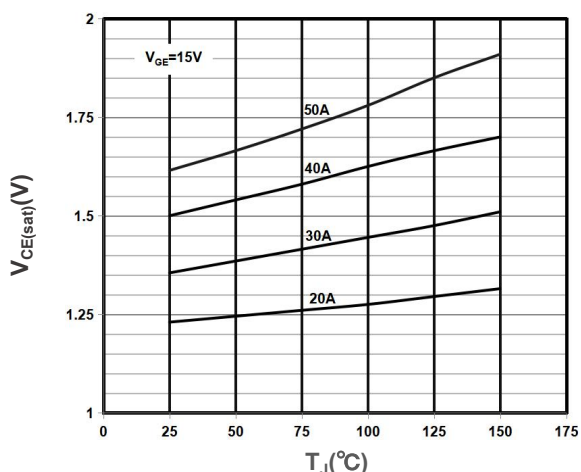
Characteristics Curves



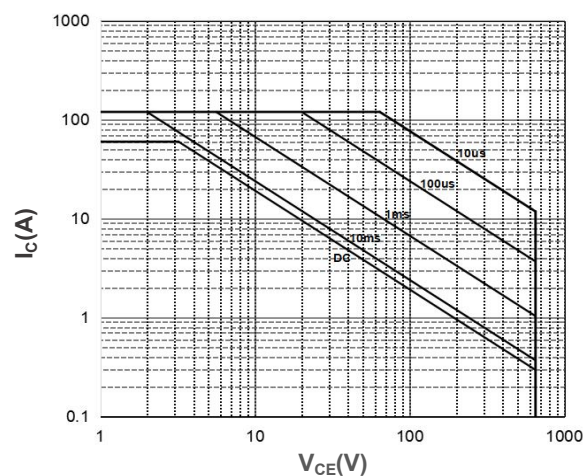
Output Characteristics



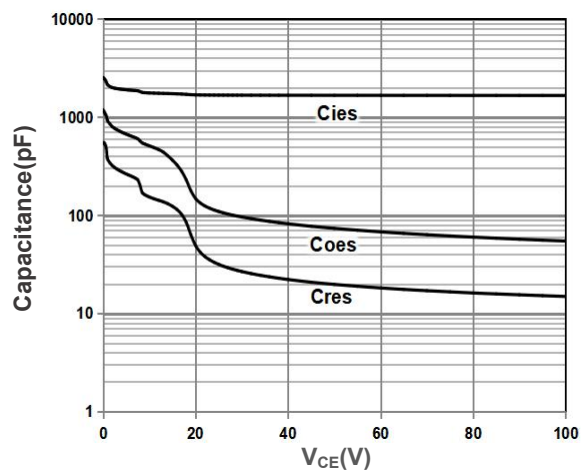
Transfer Characteristics



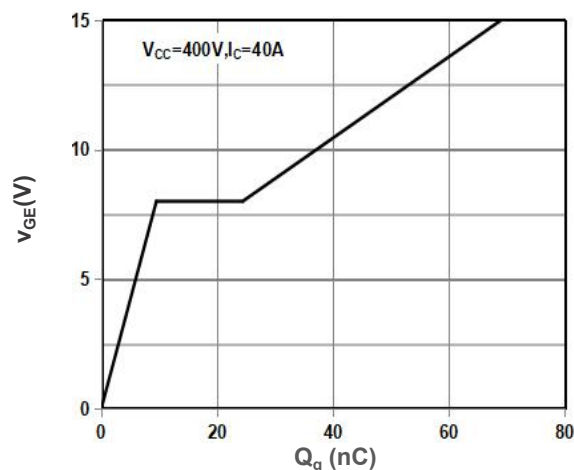
"Typical collector-emitter saturation voltage as a function of junction temperature"



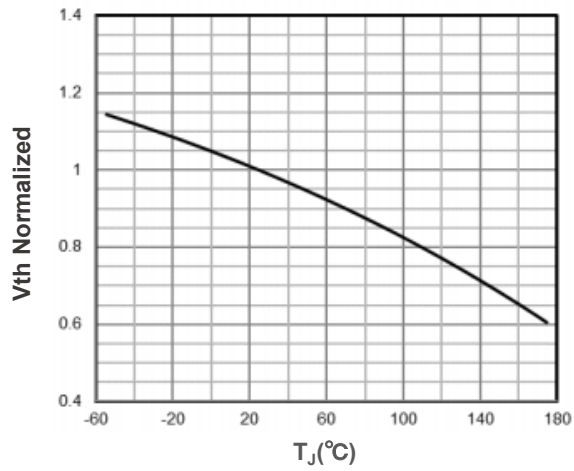
Maximum Safe Operating Area($T_a=25^\circ\text{C}$)



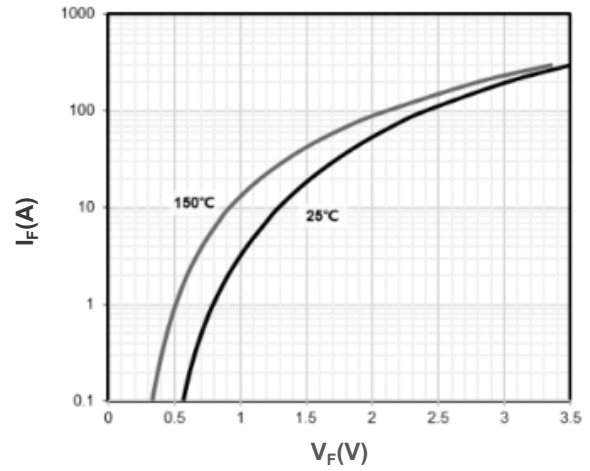
Capacitance



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
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	3.95	4.15	4.35
c	0.52		0.68	ΦP	3.40		3.80
D	20.70	20.80	21.30	ΦP1	7.00		7.40
D1	16.15		16.95	S	6.04	6.15	6.30
E	15.50	15.60	16.10				

