650V 15A IGBT

■ Applications

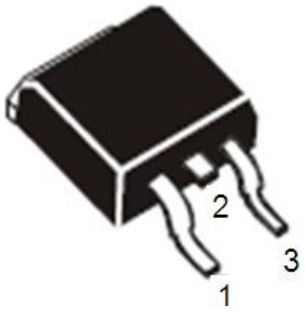
- Industrial UPS
- Welding machine
- Solar converters
- Energy Storage
- Mid to high range switching frequency converters

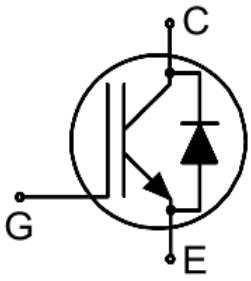
■ Features

- Low switching power loss
- Low switching surge and noise
- Advanced Fieldstop technology
- Low EMI
- Short circuit withstand time – 5uS
- Qualified according to JEDEC for target applications
- RoHS and Halogen-Free Compliant

■ Product Summary

V_{CES}	650	V
I_C	15	A
$V_{CE(sat),Typ}$@15V	1.7	V





Gate： 1

Collector： 2

Emitter： 3

TO-263

Marking	Package	Packaging	Min. package quantity
MLB15N065T4F	TO-263	Tape & Reel	800

■ 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	30 15	A
Pulsed collector current，tp limited by T_{jmax}	$I_{C\ Pulse}$	45	A
Diode forward current，limited by T_{jmax} TC=25℃ TC=100℃	I_F	30 15	A
Diode Pulsed current，tp limited by T_{jmax}	$I_{F\ Pulse}$	40	A
Continuous Gate-emitter voltage	V_{GE}	±20	V
Short circuit withstand time V_{GE}=15V,V_{CC}≤400V，T_j≤150℃	t_{SC}	5	μs
Power Dissipation （TC=25℃）	P_D	125	W
Junction Temperature	T_j	150	℃
Storage Temperature	T_{STG}	-55-150	℃

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	$R_{\theta JC}$	1	℃/W
Diode Maximum Junction-to-Case	$R_{\theta JC}$	2	℃/W
Maximum Junction-to-Ambient	$R_{\theta JA}$	60	℃/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=250uA		650	-	-	V
Zero gate voltage collector current	I_{CES}	VCE=650V,VGE=0V		-	-	200	uA
Gate-emitter leakage current	I_{GES}	V_{GE}=±20V,V_{CE}=0V		-	-	±100	nA
Gate-emitter threshold voltage	$V_{GE(TH)}$	V_{CE}=V_{GE},I_C=250uA		4..2	5..2	6.2	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	V_{GE}=15V,I_C=15A		-	1.7	2.4	V
			Tj=150°C	-	2.2	-	V
Diode forward voltage	V_F	I_F=15A		-	1.4	1.9	V
			Tj=150°C	-	1.1	-	V
Dynamic Characteristics							
Input Capacitance	C_{ies}	V_{CE}=25V,V_{GE}=0V, f=1.0MHz		-	871	-	pF
Output Capacitance	C_{oes}			-	36	-	pF
Reverse Transfer Capacitance	C_{res}			-	11	-	pF
Integrated gate resistor	R_{Gint}			-	3	-	Ω
Total Gate Charge	Q_g	V_{CC}=400V,I_C=15A, V_{GE}=15V		-	42	-	nC
Gate−to−emitter charge	Q_{ge}			-	8	-	nC
Gate−to−collector charge	Q_{gc}			-	23	-	nC
Internal emitter inductance measured 5mm (0.197 in.) from case	L_E			-	7	-	nH

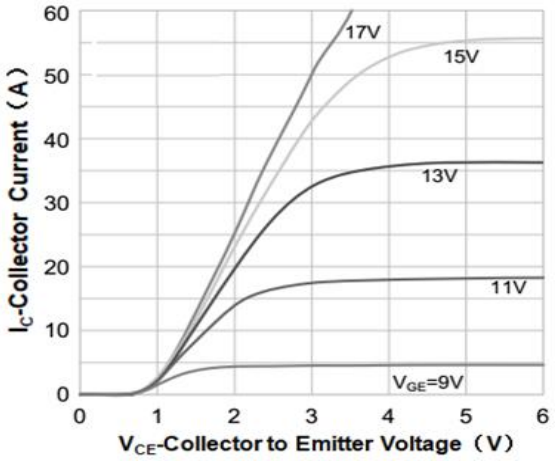
■ Switching Characteristic, Inductive Load, at T_j=25℃

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
IGBT Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	V_{CC}= 400V I_C= 15A V_{GE}= 15V R_G= 10Ω Inductive load	-	15	-	ns
Turn-On Rise Time	t_r		-	45	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	30	-	ns
Turn-Off Rise Time	t_f		-	135	-	ns
Turn-on energy	E_{on}		-	0.7	-	mJ
Turn-off energy	E_{off}		-	0.2	-	mJ
Diode Characteristics						
Reverse Recovery Time	t_{rr}	V_R=400V,I_F=15A, di/dt=200A/us	-	62	-	ns
Reverse Recovery Charge	Q_{rr}		-	0.22	-	μC
Peak Reverse Recovery Current	I_{rrm}		-	7	-	A

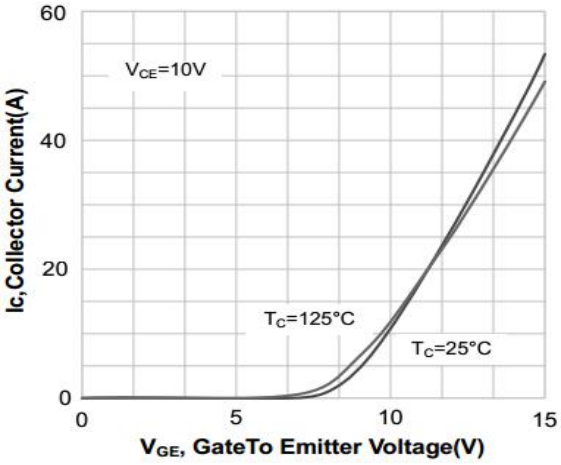
■ Switching Characteristic, Inductive Load, at T_j=150℃

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
IGBT Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	V_{CC}= 400V I_C= 15A V_{GE}= 15V R_G= 10Ω Inductive load	-	17	-	ns
Turn-On Rise Time	t_r		-	43	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	27	-	ns
Turn-Off Rise Time	t_f		-	137	-	ns
Turn-on energy	E_{on}		-	1	-	mJ
Turn-off energy	E_{off}		-	0.37	-	mJ
Diode Characteristics						
Reverse Recovery Time	t_{rr}	V_R=400V,I_F=15A, di/dt=200A/us	-	100	-	ns
Reverse Recovery Charge	Q_{rr}		-	0.55	-	μC
Peak Reverse Recovery Current	I_{rrm}		-	11	-	A

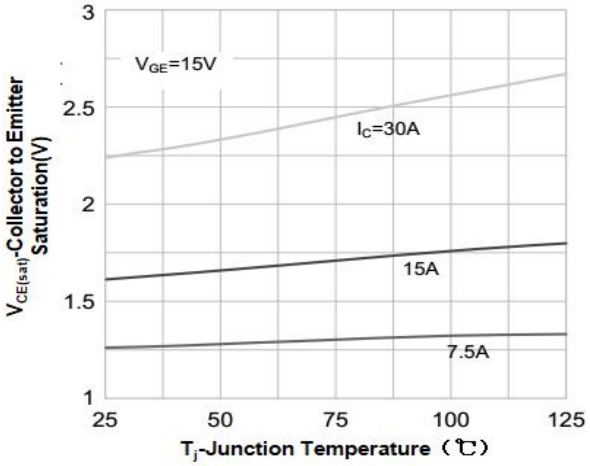
■ Characteristics Curves



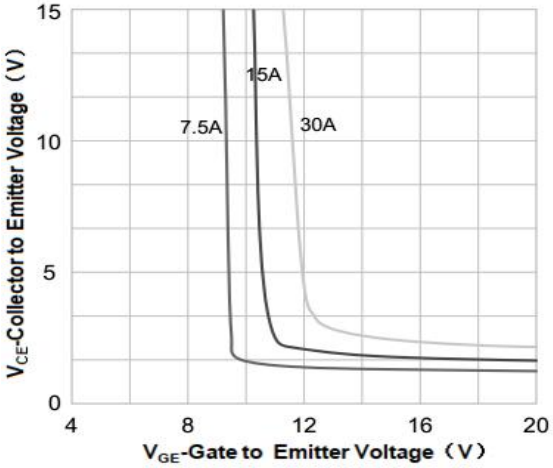
Output Characteritsics



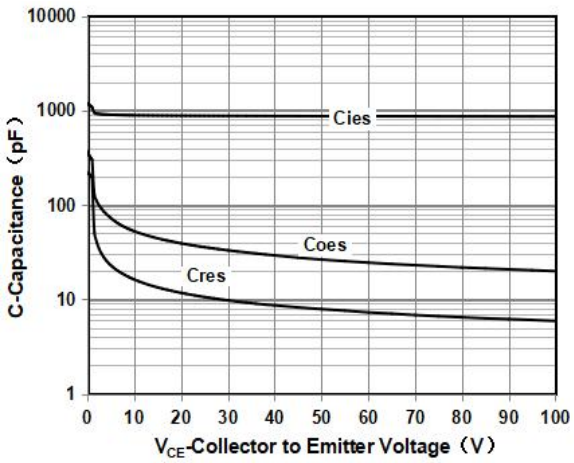
Transfer Characteritsics



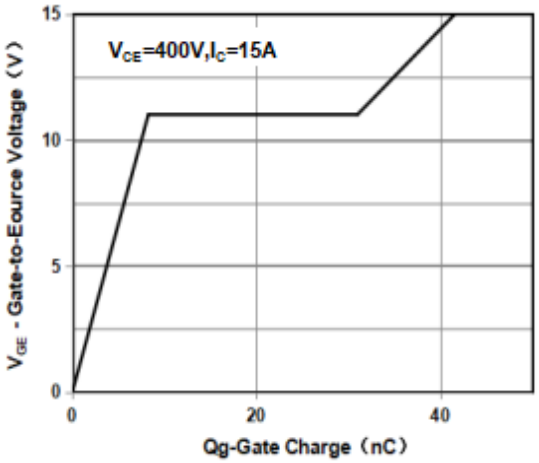
Typical collector-emitter saturation voltage as a function of junction temperature



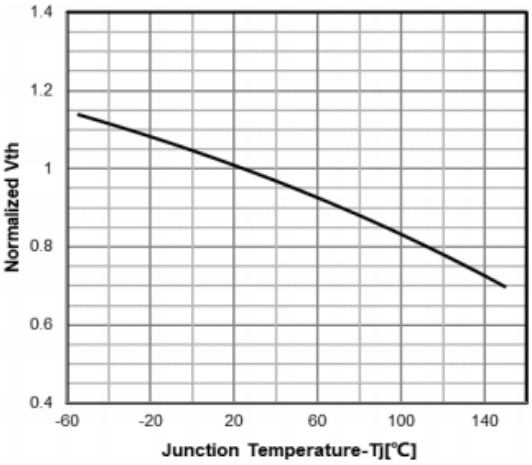
Saturation Voltage vs. V_{GE}



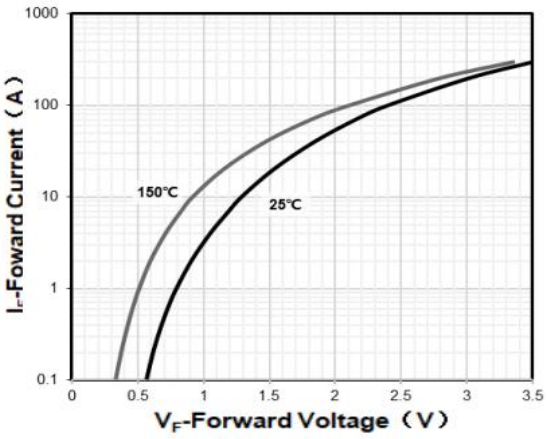
Capacitance



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-263 Package Dimensions

Unit：mm

Symbol	Min	Nom	Max	Symbol	Min	Nom	Max
A	4. 42		4. 72	E	8. 99		9. 29
B	1. 22		1. 4	e1	2. 44	2. 54	2. 64
b	0. 76		0. 86	e2	4. 98		5. 18
b1	1. 22		1. 4	L1	14. 7	15. 1	15. 5
b2	0. 33		0. 43	L2	2	2. 3	2. 6
C	1. 22		1. 35	L3	1. 5		2
D	9. 95		10. 25	K	−0. 1		0. 1