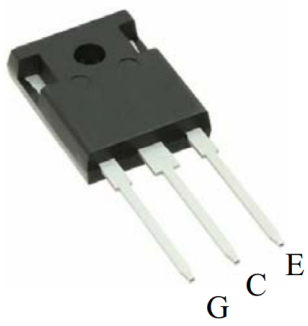


TO-247 Pin Configuration

IGBT Discrete

V_{CE}	650	V
I_C	40	A
$V_{CE(SAT)}$ I_C=40A	1.5	V

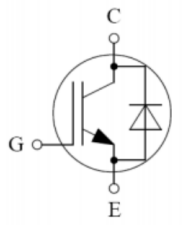
Applications

- Industrial UPS
- Energy Storage
- Charger

Features

- Low gate charge
- Maximum junction temperature 175℃
- Low EMI
- Very soft, fast recovery full current anti-parallel diode
- RoHS compliant

Circuit



Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-Emitter Breakdown Voltage	V_{CE}	650	V
DC Collector Current, limited by T_{jmax} T_C= 25°C T_C= 100°C	I_C	 80 40	A
Diode Forward Current, limited by T_{jmax} T_C= 25°C T_C= 100°C	I_F	 80 40	A
Continuous Gate-Emitter Voltage	V_{GE}	±20	V
Pulsed Collector Current, V_{GE}=15V, tp limited by T_{jmax}	I_{CM}	160	A
Power Dissipation , Tj=175°C T_C= 25°C T_C= 100°C	P_{tot}	 246 123	W
Operating Junction Temperature	T_j	-40...+175	°C
Storage Temperature	T_s	-55...+150	°C
Soldering Temperature, wave soldering 1.6mm(0.063in.) from case for 10s	-	260	°C

Thermal Resistance

Parameter	Symbol	Max. Value	Unit
IGBT Thermal Resistance, Junction - Case	$R_{th}(j\text{-}c)$	0.61	K/W
Diode Thermal Resistance, Junction - Case	$R_{th}(j\text{-}c)$	0.68	K/W
Thermal Resistance, Junction - Ambient	$R_{th}(j\text{-}a)$	40	K/W

Electrical Characteristics of the IGBT（T_j= 25℃unless otherwise specified）:

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Collector-Emitter Breakdown Voltage	BV_{CES}	V_{GE}=0V, I_C=250μA	650	-	-	V
Gate Threshold Voltage	$V_{GE(th)}$	V_{GE}=V_{CE}, I_C=250μA	3.2	4.0	4.8	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}=15V, I_C=40A T_j=25°C, T_j=125°C	- -	1.50 1.81	2.0 -	V
Zero Gate Voltage Collector Current	I_{CES}	V_{CE}=650V, V_{GE}=0V T_j= 25°C,	-	-	50	uA
Gate-Emitter Leakage Current	I_{GES}	V_{CE}= 0V, V_{GE}= ± 20V	-	-	100	nA
Input Capacitance	C_{ies}	V_{CE}= 25V, V_{GE}= 0V, f = 1MHz	-	1930	-	pF
Output Capacitance	C_{oes}		-	140	-	
Reverse Transfer Capacitance	C_{res}		-	11	-	
Gate Charge	Q_G	V_{CC}=520V,I_C= 40A, V_{GE}=15V	-	70.5	-	nC
Gate-Emitter Charge	Q_{GE}		-	8	-	
Gate-Collector Charge	Q_{GC}		-	17	-	

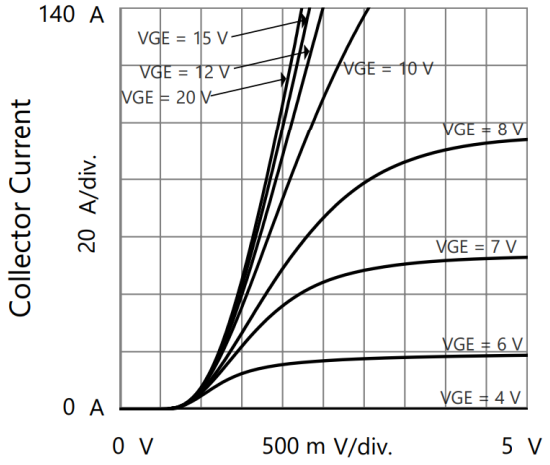
Switching Characteristic, Inductive Load（T_j= 25℃unless otherwise specified）:

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-on Delay Time	$t_{d(on)}$	V_{CC}= 400V, I_C=40A, V_{GE}= 15V R_g=12Ω	-	15	-	ns
Rise Time	t_r		-	26	-	ns
Turn-on Energy	E_{on}		-	1.30	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	105	-	ns
Fall Time	t_f		-	30	-	ns
Turn-off Energy	E_{off}		-	0.50	-	mJ
Turn-on Delay Time	$t_{d(on)}$	V_{CC}= 400V, I_C=20A, V_{GE}= 15V R_g=12Ω	-	16	-	ns
Rise Time	t_r		-	11	-	ns
Turn-on Energy	E_{on}		-	0.47	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	118	-	ns
Fall Time	t_f		-	20	-	ns
Turn-off Energy	E_{off}		-	0.20	-	mJ

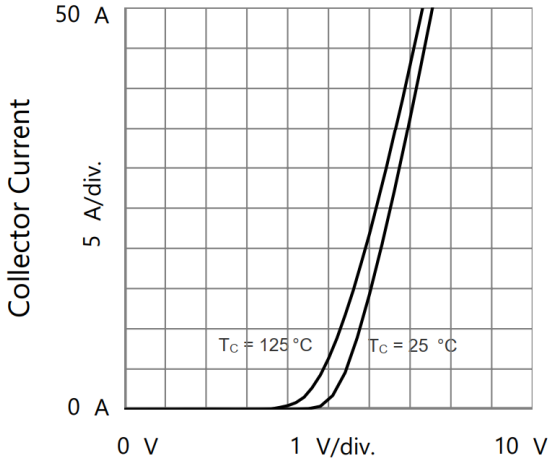
Electrical Characteristics of the DIODE（T_j= 25℃unless otherwise specified）:

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_F	I_F= 40A	-	1.50	-	V
Reverse Recovery Time	T_{rr}	VR=400V, IF=40A dIF/dt=1000A/μs	-	140	-	ns
Reverse Recovery Charge	Q_{rr}		-	1.45	-	uC
Reverse Recovery Time	T_{rr}	VR=400V, IF=20A dIF/dt=1000A/μs	-	123	-	ns
Reverse Recovery Charge	Q_{rr}		-	1.07	-	uC

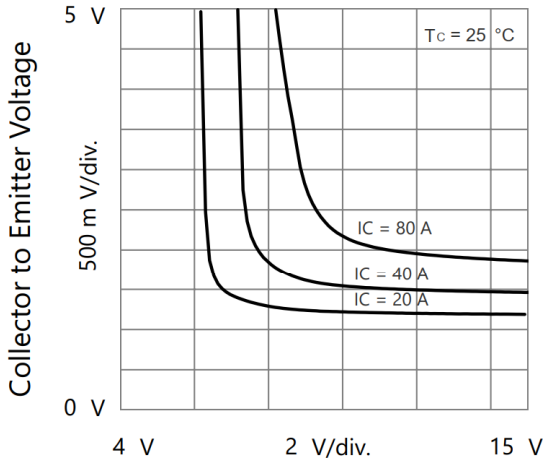
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



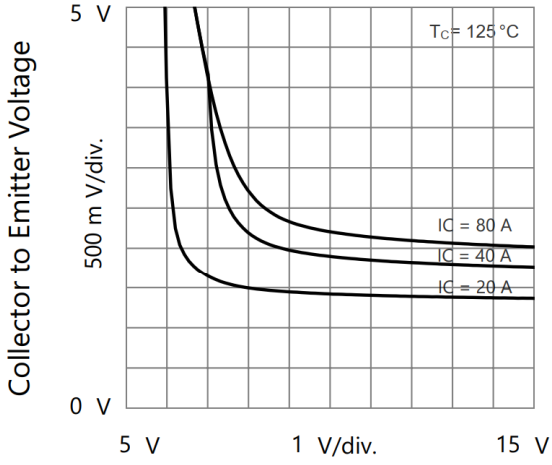
Output Characteristics



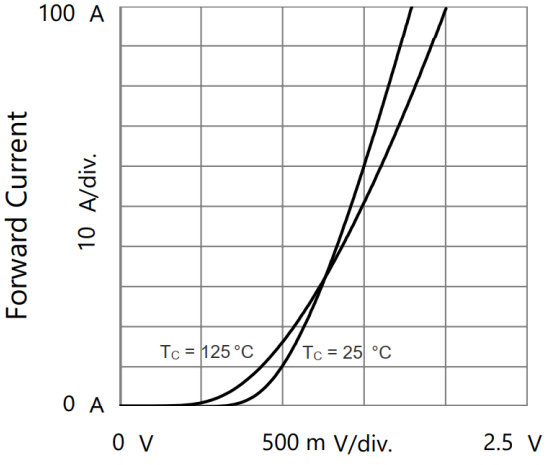
Transfer Characteristics



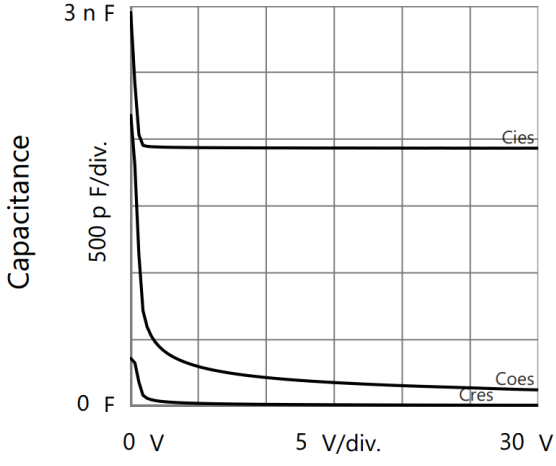
Collector to Emitter Voltage vs. Gate to Emitter Voltage



Collector to Emitter Voltage vs. Gate to Emitter Voltage

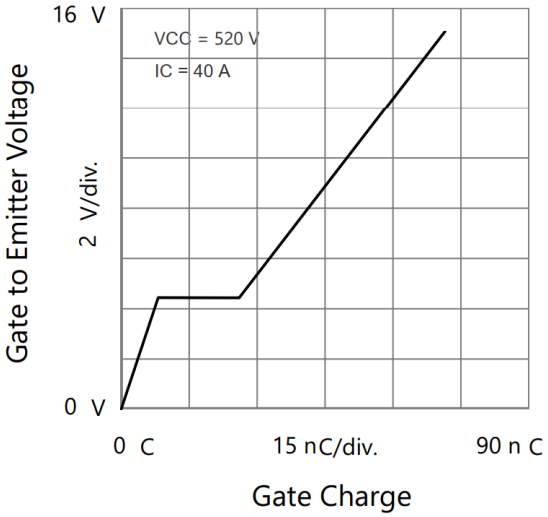


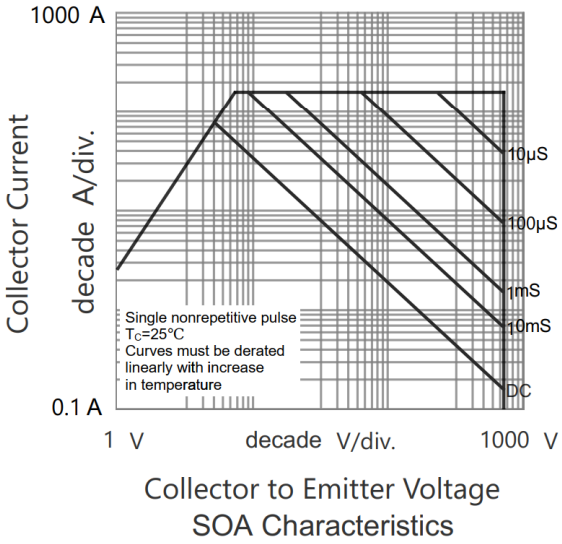
Freewheeling Diode Forward Characteristics



Capacitances

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)





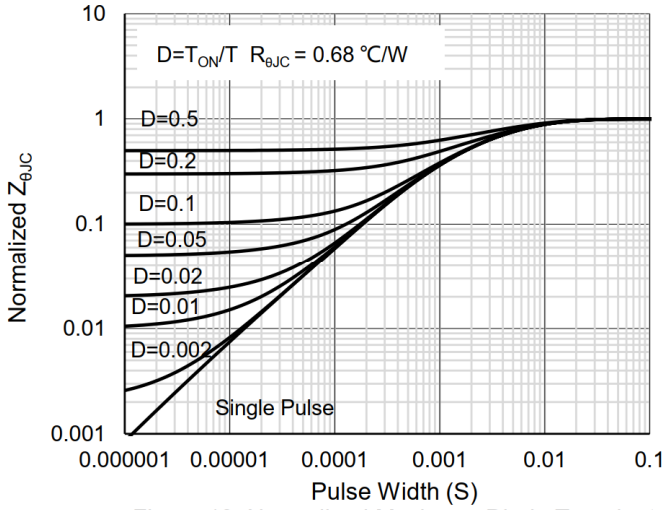
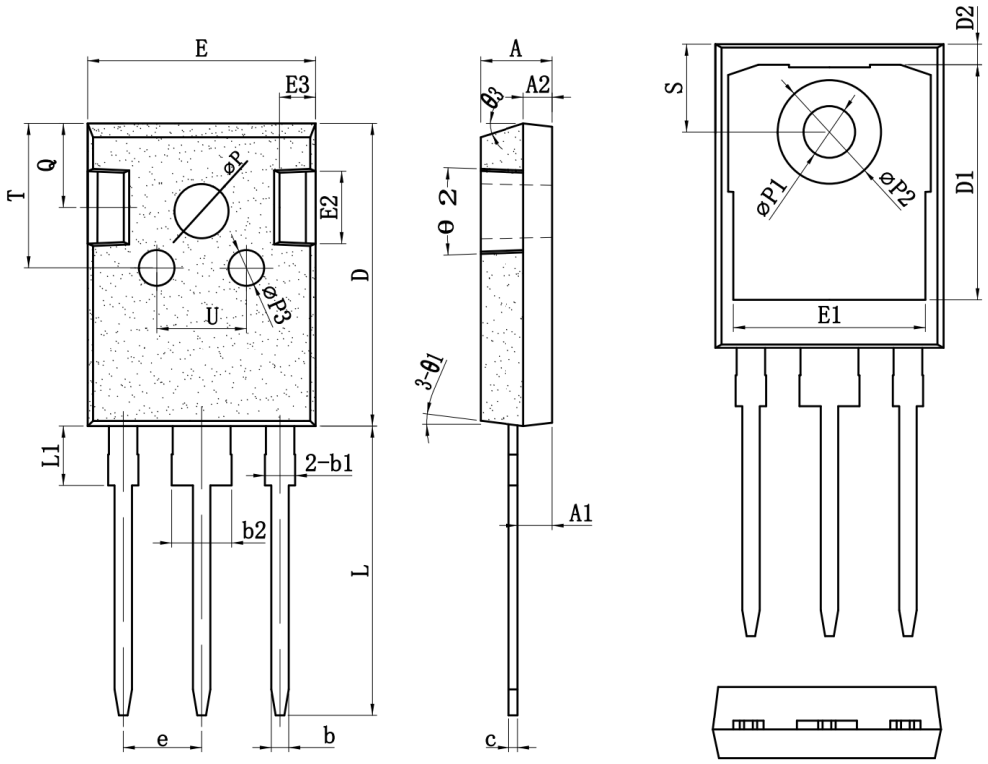


Figure 19: Normalized Maximum Diode Transient Thermal Impedance

TO-247_3L PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	TYP	MAX	SYMBOL	MIN	TYP	MAX
A	4.60	5.00	5.40	e	2.10	5.44	5.70
A1	2.10	2.41	2.70	L	19.00	19.98	21.00
A2	1.70	2.00	2.30	L1	-	-	4.50
b	1.00	1.20	1.40	ΦP	3.30	3.70	4.00
b1	1.80	2.10	2.40	ΦP1	3.25	3.55	3.85
b2	2.80	3.10	3.40	ΦP2	6.80	7.18	7.60
C	0.45	0.60	0.75	ΦP3	2.30	2.50	3.30
D	19.00	21.00	23.00	Q	5.50	5.80	6.30
D1	16.00	16.55	17.00	S	5.60	6.15	6.30
D2	0.95	1.20	1.45	T	9.50	10.00	10.50
E	15.70	15.80	16.50	U	6.00	-	8.00
E1	12.80	13.25	13.70	θ1	5°	7°	9°
E2	4.20	5.00	5.30	θ2	1°	3°	5°
E3	2.20	2.50	2.80	θ3	13°	15°	17°

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