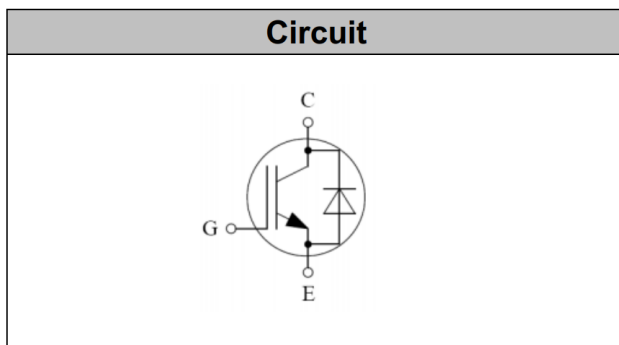


## IGBT Discrete

$V_{CE}$	<b>1200</b>	<b>V</b>
$I_C$	<b>40</b>	<b>A</b>
$V_{CE(SAT)} I_C=40A$	<b>1.49</b>	<b>V</b>



### Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- Uninterruptible power supply

### Features

- High breakdown voltage to 1200V for improved reliability
- Maximum junction temperature 175°C
- Positive temperature coefficient
- Including fast & soft recovery anti-parallel FWD
- High short circuit capability(10us)

## Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-Emitter Breakdown Voltage	$V_{CE}$	1200	V
DC Collector Current, limited by $T_{jmax}$ $T_C=25^{\circ}C$ $T_C=100^{\circ}C$	$I_C$	80 40	A
Diode Forward Current, limited by $T_{jmax}$ $T_C=25^{\circ}C$ $T_C=100^{\circ}C$	$I_F$	80 40	A
Continuous Gate-Emitter Voltage	$V_{GE}$	$\pm 20$	V
Transient Gate-Emitter Voltage ( $t_p \leq 10\mu s, D < 0.010$ )	$V_{GE}$	$\pm 30$	V
Turn off Safe Operating Area $V_{CE} \leq 1200V$ , $T_j \leq 150^{\circ}C$		160	A
Pulsed Collector Current, $V_{GE}=15V$ , $t_p$ limited by $T_{jmax}$	$I_{CM}$	160	A
Diode Pulsed Current, $t_p$ limited by $T_{jmax}$	$I_{Fpuls}$	160	A
Short Circuit Withstand Time, $V_{GE}=15V, V_{CC}=900V, V_{CEM} \leq 1200V$	$T_{sc}$	10	$\mu s$
Power Dissipation, $T_j=175^{\circ}C, T_C=25^{\circ}C$	$P_{tot}$	428	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

**Electrical Characteristics of the IGBT** ( $T_j = 25^\circ\text{C}$  unless otherwise specified):

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Collector-Emitter Breakdown Voltage	$BV_{CES}$	$V_{GE}=0V, I_C=250\mu A$	1200		-	V
Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=1.0mA$	5.1	5.6	6.5	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=20A$ $T_j=25^\circ\text{C}$ , $T_j=125^\circ\text{C}$ $T_j=150^\circ\text{C}$		1.49 2.00 2.10	2.10	V
Zero Gate Voltage Collector Current	$I_{CES}$	$V_{CE}=1200V, V_{GE}=0V$ $T_j=25^\circ\text{C}$ , $T_j=150^\circ\text{C}$			0.25 5.00	mA
Gate-Emitter Leakage Current	$I_{GES}$	$V_{CE}=0V, V_{GE}=\pm 30V$			100	nA

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Dynamic</b>						
Input Capacitance	$C_{ies}$	$V_{CE}=30V, V_{GE}=0V,$ $f=1MHz$	-	4.80	-	nF
Reverse Transfer Capacitance	$C_{res}$		-	0.14	-	
Gate Charge	$Q_G$	$V_{CC}=960V, I_C=40A,$ $V_{GE}=15V$	-	0.33	-	uC
Short Circuit Collector Current	$I_{SC}$	$V_{GE}=15V, t_{sc}\leq 10\mu s,$ $V_{CC}=900V, T_j\leq 150^\circ\text{C}$	-	140	-	A

**Electrical Characteristics of the Diode** ( $T_j = 25^\circ\text{C}$  unless otherwise specified):

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Diode Forward Voltage	$V_F$	$I_F = 20\text{A}$ $T_j = 25^\circ\text{C}$ , $T_j = 125^\circ\text{C}$ $T_j = 150^\circ\text{C}$		1.51 1.30 1.20		V

**Switching Characteristic, Inductive Load** ( $T_j = 25^\circ\text{C}$  unless otherwise specified):

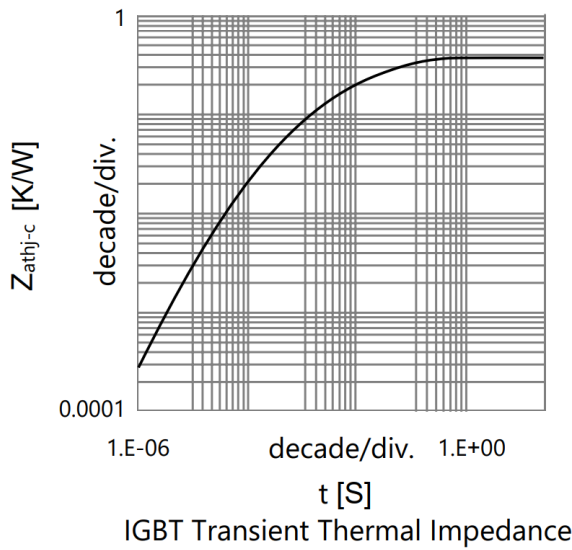
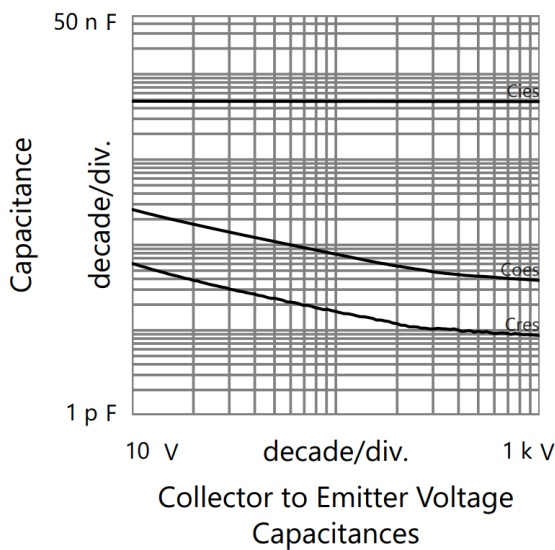
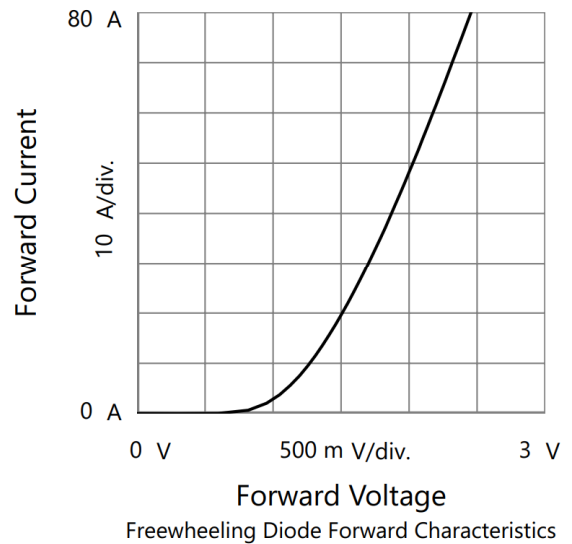
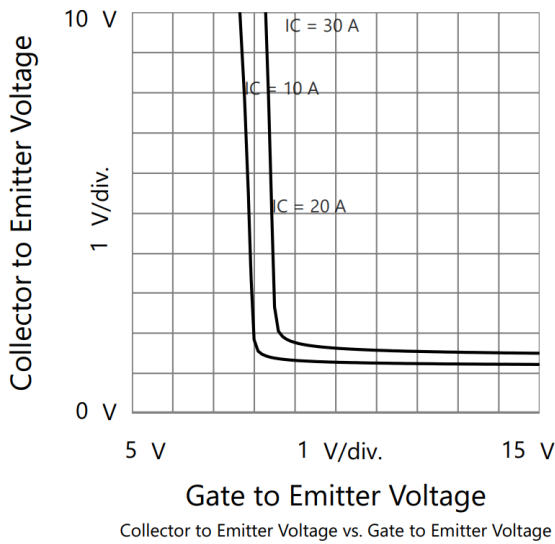
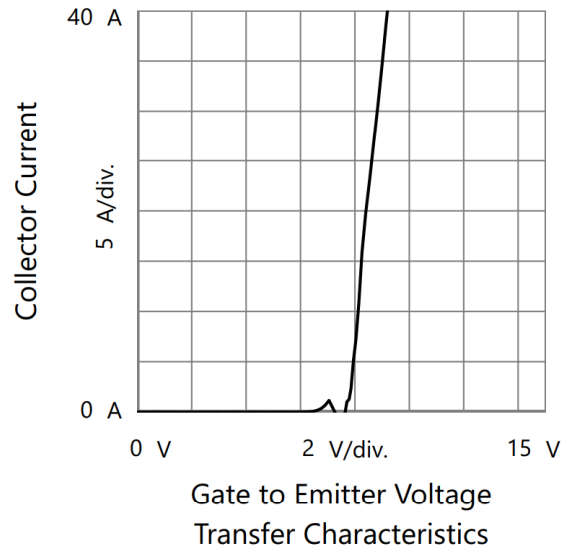
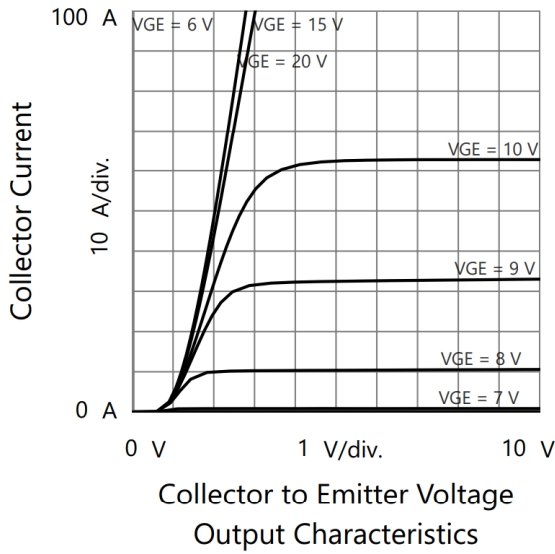
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-on Delay Time	$t_{d(\text{on})}$	$V_{CC} = 600\text{V}$ , $I_C = 40\text{A}$ , $V_{GE} = -15\text{V} \sim 15\text{V}$ , $R_g = 12\Omega$	-	45	-	ns
Rise Time	$t_r$		-	56	-	ns
Turn-on Energy	$E_{\text{on}}$		-	3.8	-	mJ
Turn-off Delay Time	$t_{d(\text{off})}$		-	180	-	ns
Fall Time	$t_f$		-	80	-	ns
Turn-off Energy	$E_{\text{off}}$		-	1.7	-	mJ

**Electrical Characteristics of the DIODE** ( $T_j = 25^\circ\text{C}$  unless otherwise specified):

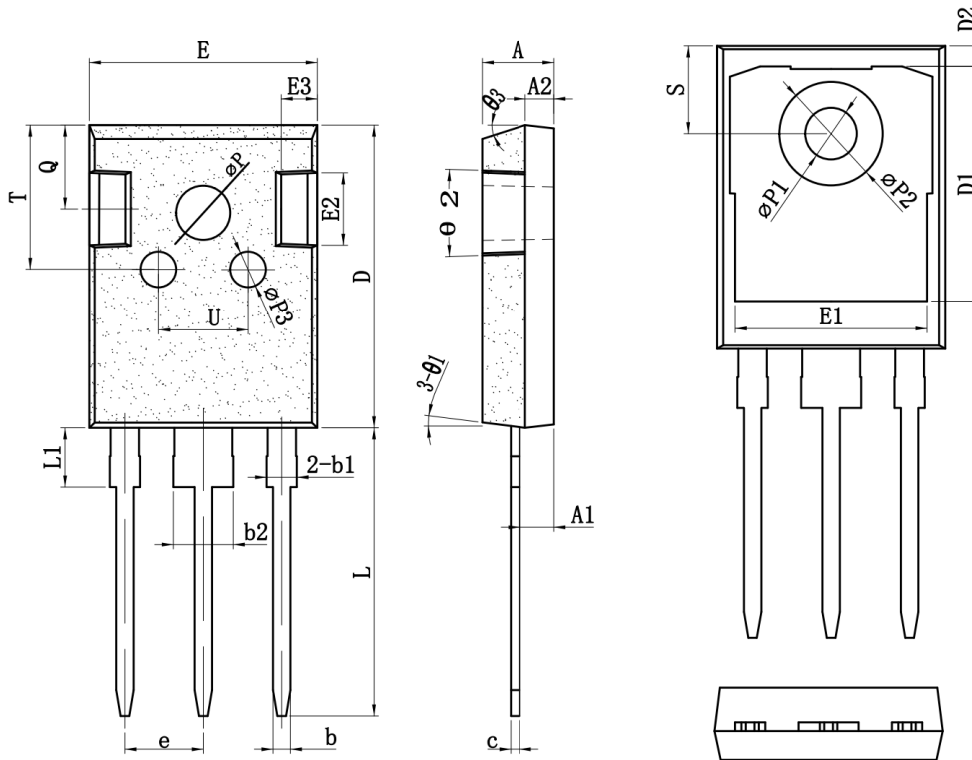
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	$V_{FM}$	$I_F = 40\text{A}$	-	1.90	-	V
Reverse Recovery Current	$I_{rr}$	$I_F = 40\text{A}$ , $V_R = 600\text{V}$ , $di/dt = -1800\text{A}/\mu\text{s}$ ,	-	21	-	A
Reverse Recovery Charge	$Q_{rr}$		-	2.40	-	$\mu\text{C}$
Reverse Recovery Energy	$E_{\text{rec}}$		-	1.00		mJ

**Thermal Resistance**

Parameter	Symbol	Max. Value	Unit
IGBT Thermal Resistance, Junction - Case	$R_{th(j-c)}$	0.35	K/W
Diode Thermal Resistance, Junction - Case	$R_{th(j-c)}$	0.65	K/W
Thermal Resistance, Junction - Ambient	$R_{th(j-a)}$	40	K/W



**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	$\phi P$	3.30	3.70	4.00
b1	1.80	2.10	2.40	$\phi P1$	3.25	3.55	3.85
b2	2.80	3.10	3.40	$\phi P2$	6.80	7.18	7.60
C	0.45	0.60	0.75	$\phi P3$	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	$\theta 1$	5°	7°	9°
E2	4.20	5.00	5.30	$\theta 2$	1°	3°	5°
E3	2.20	2.50	2.80	$\theta 3$	13°	15°	17°

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