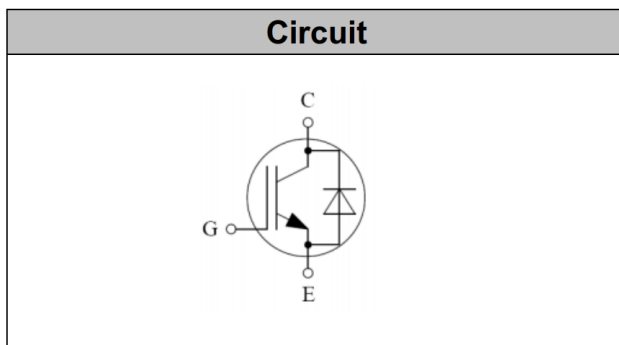


IGBT Discrete

V_{CE}	650	V
I_C	20	A
$V_{CE(SAT)} I_C=20A$	1.6	V



Applications

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

Features

- High breakdown voltage to 650V 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 ($T_j=25^\circ\text{C}$ unless otherwise specified):

Parameter	Symbol	Value	Unit
Collector-Emitter Breakdown Voltage	V_{CE}	650	V
DC Collector Current, limited by T_{jmax} $T_C=25^\circ\text{C}$ $T_C=100^\circ\text{C}$	I_C	40 20	A
Diode Forward Current, limited by T_{jmax} $T_C=25^\circ\text{C}$ $T_C=100^\circ\text{C}$	I_F	40 20	A
Continuous Gate-Emitter Voltage	V_{GE}	± 20	V
Transient Gate-Emitter Voltage ($t_p \leq 10\mu\text{s}, D < 0.010$)	V_{GE}	± 30	V
Pulsed Collector Current, $V_{GE}=15\text{V}$, t_p limited by T_{jmax}	I_{CM}	60	A
Diode Pulsed Current, t_p limited by T_{jmax}	I_{Fpuls}	60	A
Power Dissipation, $T_C=25^\circ\text{C}$	P_{tot}	145	W
Power Dissipation, $T_C=100^\circ\text{C}$	P_{tot}	61	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
Static						
Collector-Emitter Breakdown Voltage	BV_{CES}	$V_{GE}=0V, I_C=250\mu A$	650	-	-	V
Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=1mA$	4	5.5	6.8	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=20A$ $T_j=25^\circ\text{C}$, $T_j=125^\circ\text{C}$ $T_j=150^\circ\text{C}$	-	1.6 1.8 2.1	2.2	V
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V$ $T_j=25^\circ\text{C}$, $T_j=150^\circ\text{C}$	-	-	1.00 4.00	mA
Gate-Emitter Leakage Current	I_{GES}	$V_{CE}=0V, V_{GE}=\pm 20V$	-	-	± 200	nA

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Dynamic						
Input Capacitance	C_{ies}	$V_{CE}=30V, V_{GE}=0V,$ $f=1MHz$	-	1680	-	pF
Output Capacitance	C_{oes}		-	66	-	
Reverse Transfer Capacitance	C_{res}		-	43	-	
Gate Charge	Q_g	$V_{CC}=300V, I_C=20A,$ $V_{GE}=15V$	-	101	-	nC
Gate-Emitter Charge	Q_{ge}		-	22	-	
Gate-Collector Charge	Q_{gc}		-	52	-	

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

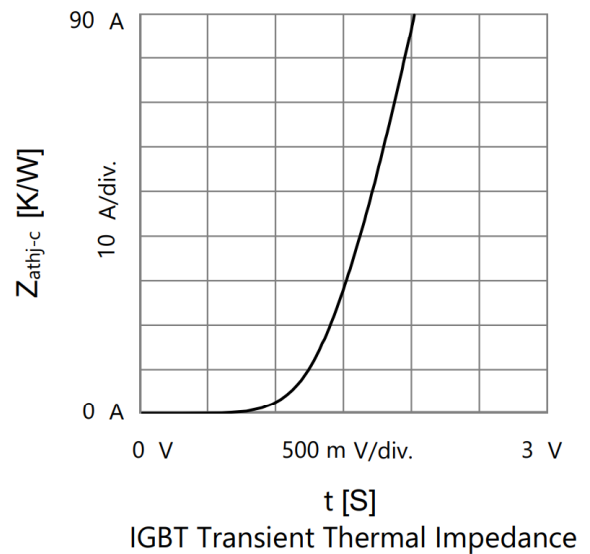
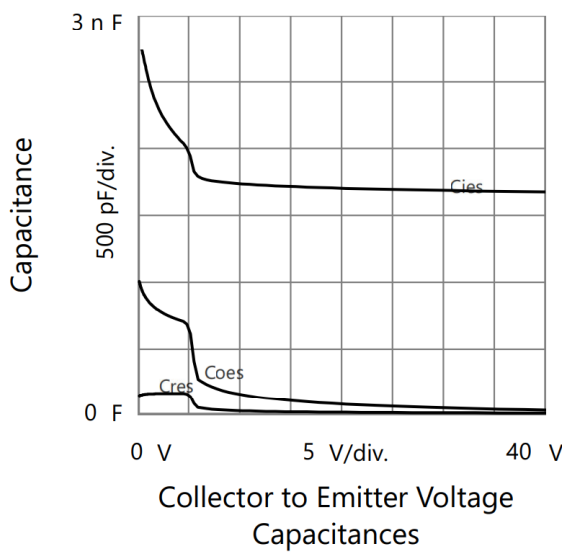
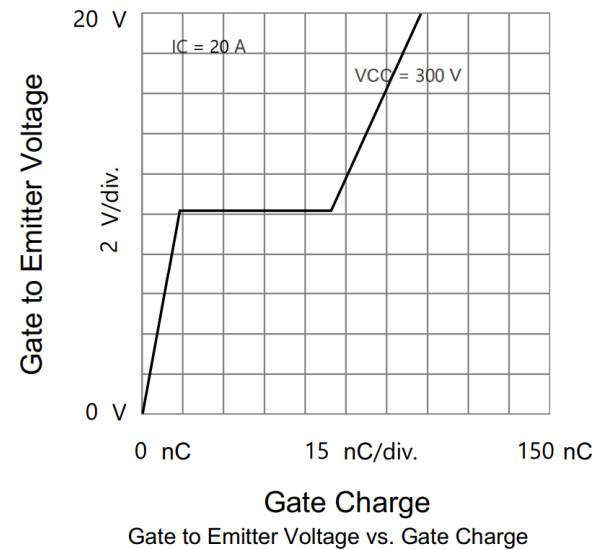
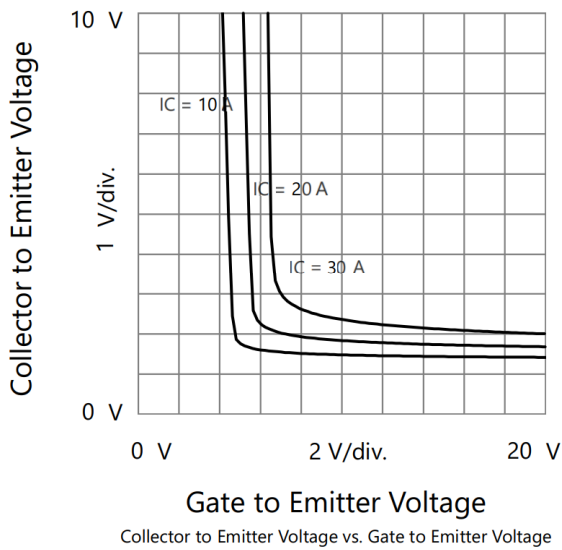
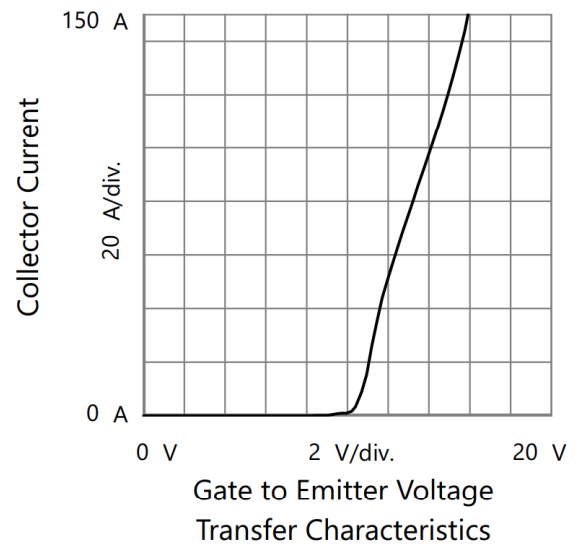
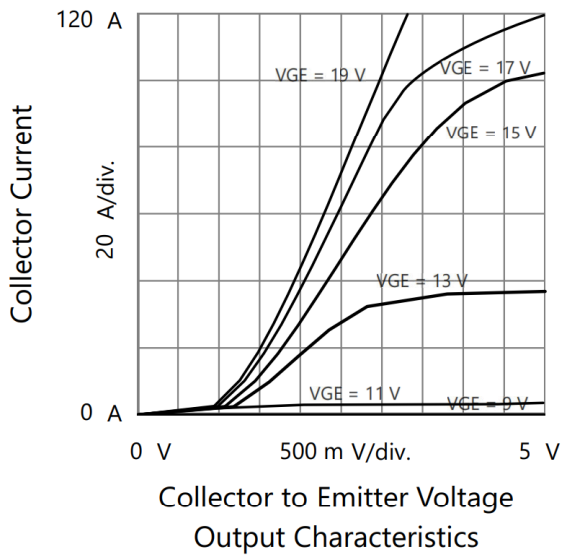
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-on Delay Time	$t_{d(on)}$	$V_{CC} = 300\text{V}$, $I_C = 20\text{A}$, $V_{GE} = -15\text{V} \sim 15\text{V}$, $R_g = 10\Omega$	-	32	-	ns
Rise Time	t_r		-	38	-	ns
Turn-on Energy	E_{on}		-	0.66	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	150	-	ns
Fall Time	t_f		-	30	-	ns
Turn-off Energy	E_{off}		-	0.5	-	mJ

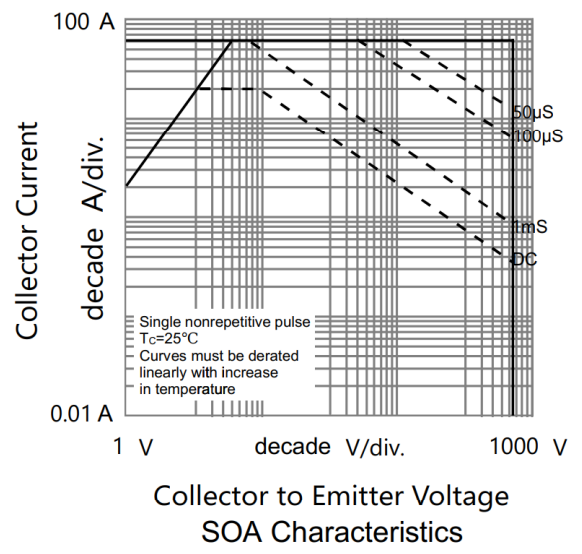
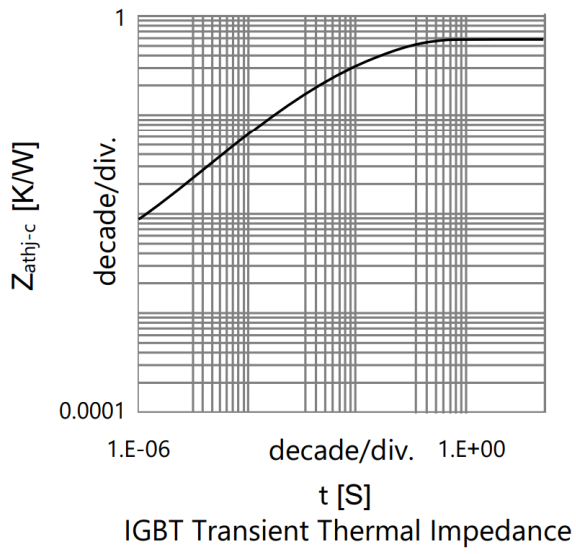
Electrical Characteristics of the DIODE ($T_j = 25^\circ\text{C}$ unless otherwise specified):

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_F	$I_F = 10\text{A}$	-	1.4	2.1	V
Reverse Recovery Current	I_{rr}	$I_F = 10\text{A}$, $V_R = 300\text{V}$, $di/dt = -200\text{A}/\mu\text{s}$,	-	4	-	A
Reverse Recovery Charge	Q_{rr}		-	201	-	nC
Reverse Recovery Energy	E_{rec}		-	0.15	-	mJ

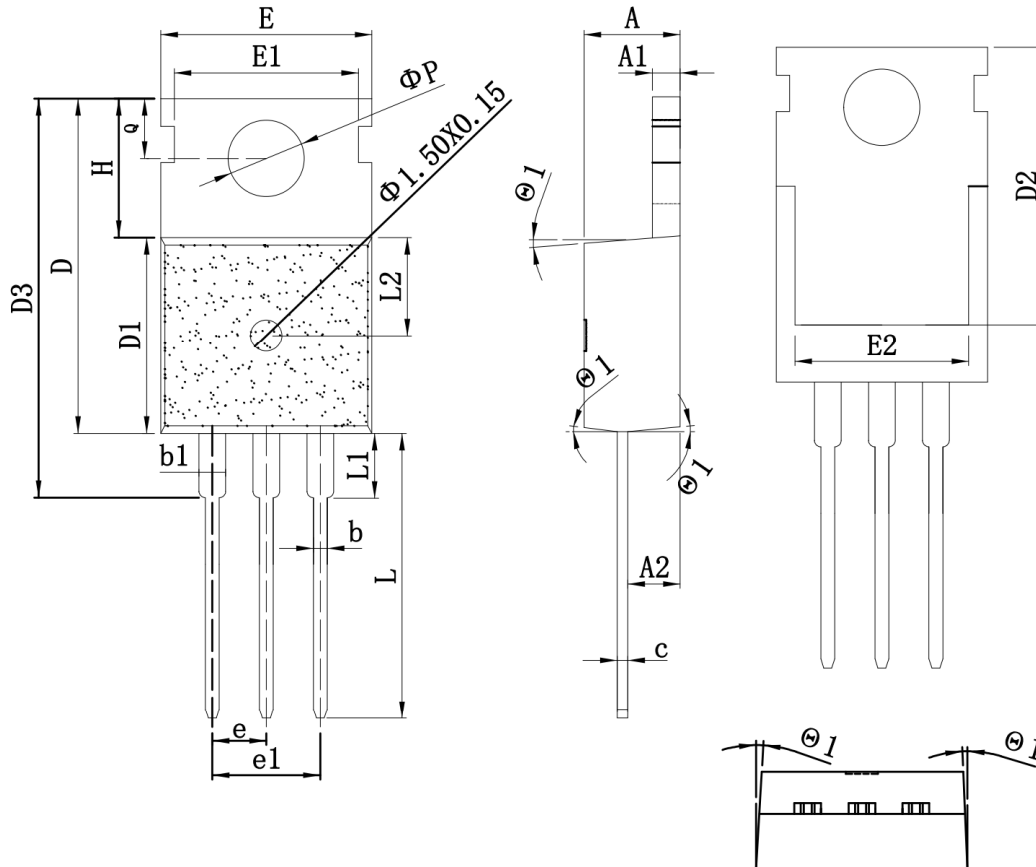
Thermal Resistance

Parameter	Symbol	Max. Value	Unit
IGBT Thermal Resistance, Junction - Case	$R_{th(j-c)}$	0.88	$^\circ\text{C}/\text{W}$
Diode Thermal Resistance, Junction - Case	$R_{th(j-c)}$	2.79	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction - Ambient	$R_{th(j-a)}$	59	$^\circ\text{C}/\text{W}$





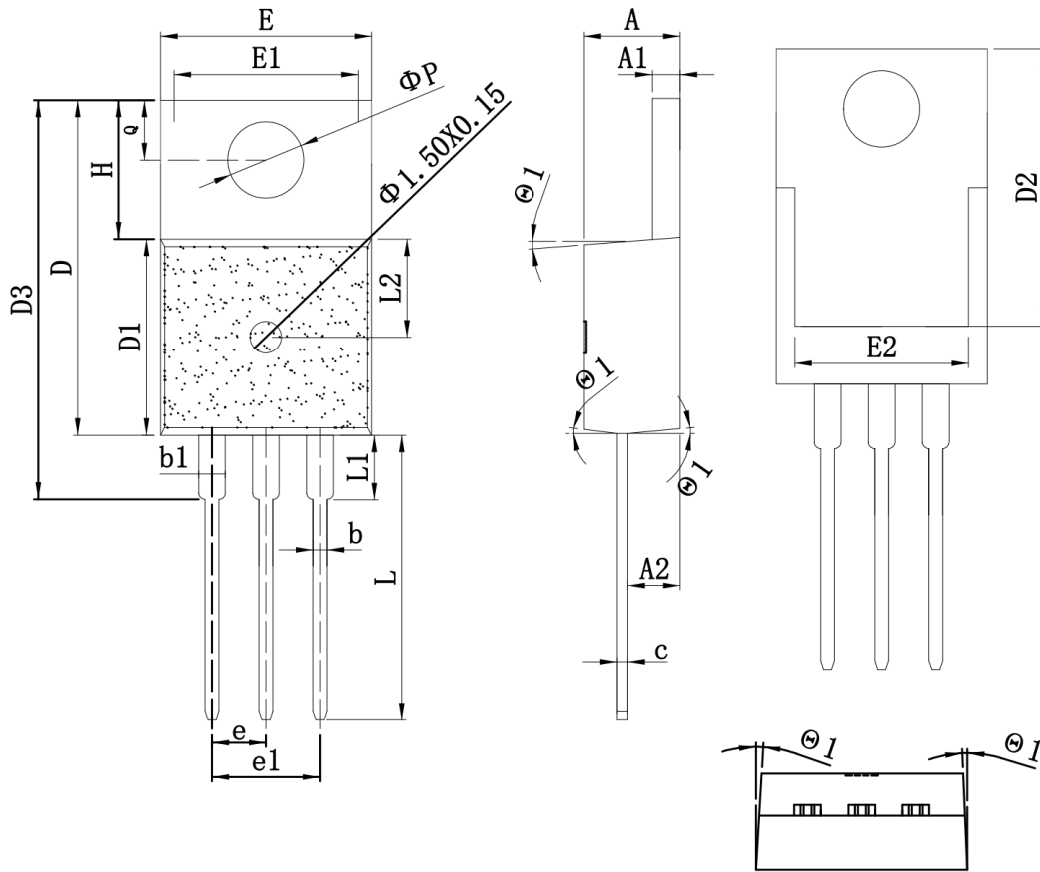
TO-220_3L-A PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	mm			SYMBOL	mm		
	MIN	TYP	MAX		MIN	TYP	MAX
A	4.15	4.50	4.80	E1	8.25	8.70	9.15
A1	1.15	1.30	1.50	E2	7.20	8.00	8.80
A2	2.10	2.40	2.65	e	2.38	2.54	2.74
b	0.65	0.80	1.00	e1	5.08REF		
b1	1.10	1.33	1.80	H	6.20	6.50	6.90
c	0.35	0.50	0.65	L	12.75	13.28	13.70
D	14.25	15.75	16.15	L1	-	-	3.50
D1	8.70	9.20	9.60	L2	2.30	4.65	7.00
D2	12.30	13.10	13.85	ϕP	3.40	3.65	3.85
D3	16.20	18.80	20.60	Q	2.50	2.80	3.00
E	8.68	10.02	11.00	θ	2°	-	7°

TO-220_3L-B PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	mm			SYMBOL	mm		
	MIN	TYP	MAX		MIN	TYP	MAX
A	4.15	4.50	4.80	E1	8.25	8.70	9.15
A1	1.15	1.30	1.50	E2	7.20	8.00	8.80
A2	2.10	2.40	2.65	e	2.38	2.54	2.74
b	0.65	0.80	1.00	e1	5.08REF		
b1	1.10	1.33	1.80	H	6.20	6.50	6.90
c	0.35	0.50	0.65	L	12.75	13.28	13.70
D	14.25	15.75	16.15	L1	-	-	3.50
D1	8.70	9.20	9.60	L2	2.30	4.65	7.00
D2	12.30	13.10	13.85	ϕP	3.40	3.65	3.85
D3	16.20	18.80	20.60	Q	2.50	2.80	3.00
E	8.68	10.02	11.00	θ	2°	-	7°

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