

## IGBT Discrete

$V_{CE}$	<b>650</b>	<b>V</b>
$I_C$	<b>20</b>	<b>A</b>
$V_{CE(SAT)} I_C=20A$	<b>1.6</b>	<b>V</b>

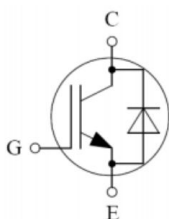
### Applications

- 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)

### Circuit



### 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	$V_{GE}$	$\pm 20$	V
Transient Gate-Emitter Voltage ( $t_p \leq 10\mu\text{s}, D < 0.010$ )	$V_{GE}$	$\pm 30$	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
<b>Static</b>						
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	$I_{GES}$	$V_{CE}=0V, V_{GE}=\pm 20V$	-	-	$\pm 200$	nA

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>Dynamic</b>						
Input Capacitance	$C_{ies}$	$V_{CE}=30V, V_{GE}=0V,$ $f=1MHz$	-	1680	-	pF
Onput 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):

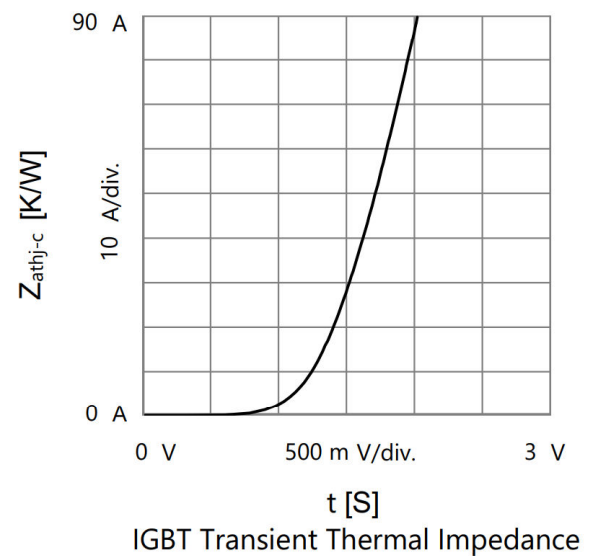
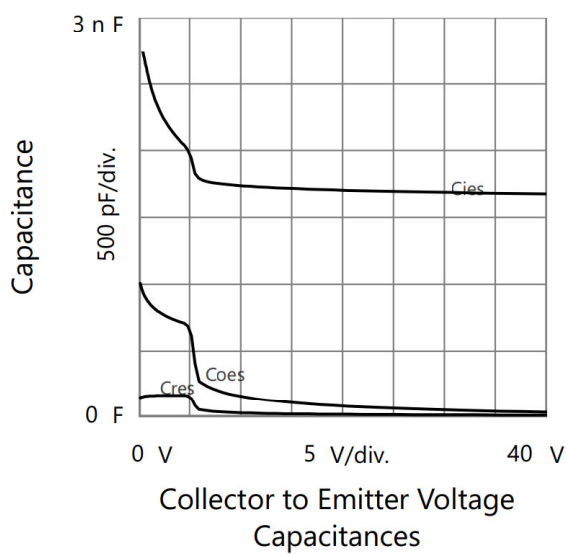
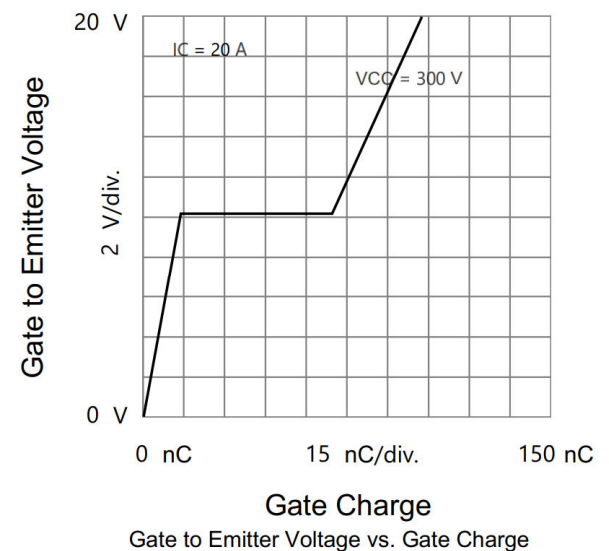
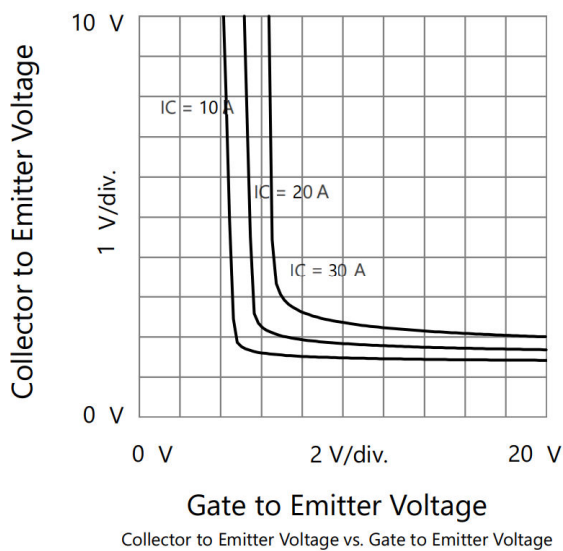
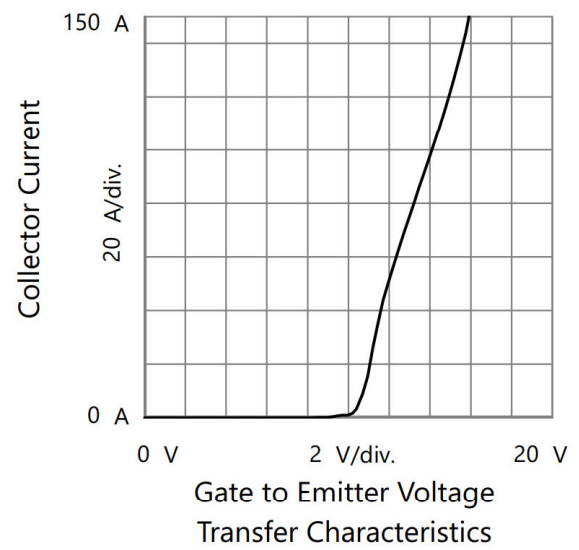
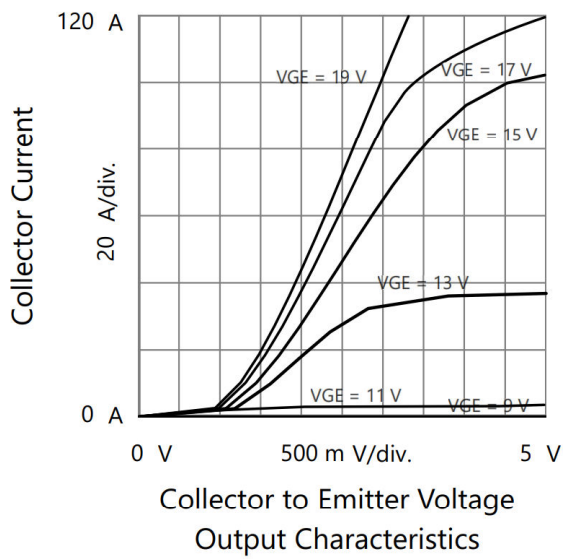
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-on Delay Time	$t_{d(on)}$	$V_{CC} = 300\text{V}$ , $I_C = 20\text{A}$ , $V_{GE} = -15\text{V} \sim 15\text{V}$ , $R_g = 10\Omega$	-	32	-	ns
Rise Time	$t_r$		-	38	-	ns
Turn-on Energy	$E_{on}$		-	0.66	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	150	-	ns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

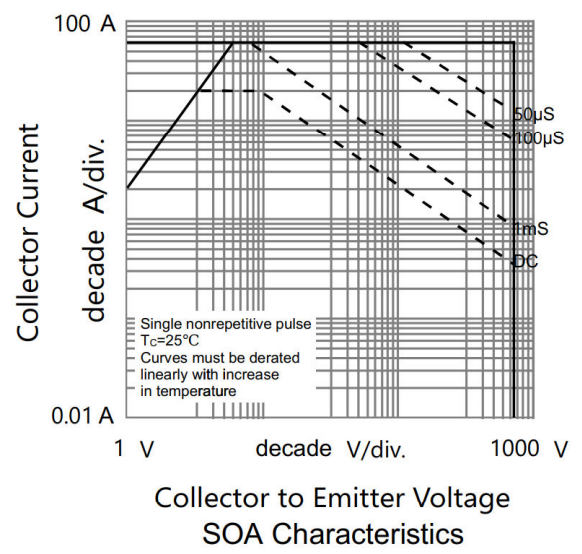
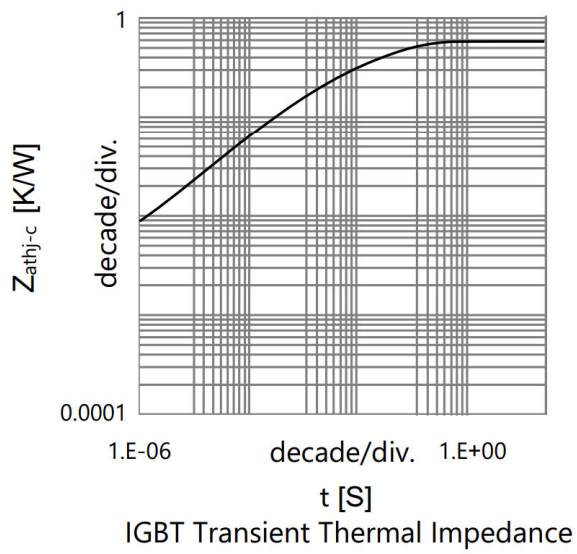
**Electrical Characteristics of the DIODE** ( $T_j = 25^\circ\text{C}$  unless otherwise specified):

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

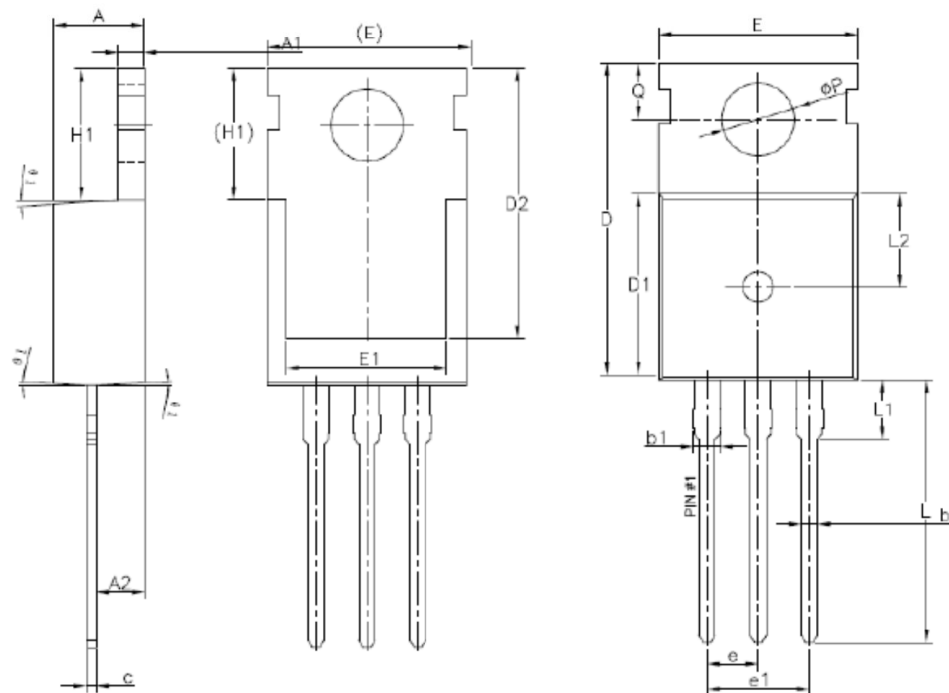
**Thermal Resistance**

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	$^\circ\text{C}/\text{W}$

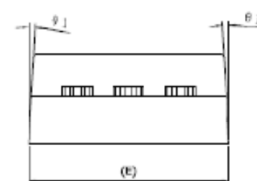




# TO-220 Package Outline Information



SYMBOL	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	1.27	1.30	1.33
A2	2.30	2.40	2.50
b	0.70	—	0.90
b1	1.27	—	1.40
c	0.45	0.50	0.60
D	15.30	15.70	16.10
D1	9.10	9.20	9.30
D2	13.10	—	13.70
E	9.70	9.90	10.20
E1	7.80	8.00	8.20
e	2.49	2.54	2.59
e1	5.03	5.08	5.12
H1	6.30	6.50	6.70
L	12.78	13.08	13.38
L1	3.30	—	3.50
L2	4.50	4.60	4.70
$\phi P$	3.55	3.60	3.65
Q	2.73	—	2.87
$\theta 1$	1°	3°	5°





## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Din-Tek Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Din-Tek"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Din-Tek makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Din-Tek disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Din-Tek's knowledge of typical requirements that are often placed on Din-Tek products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Din-Tek's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Din-Tek products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Din-Tek product could result in personal injury or death. Customers using or selling Din-Tek products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Din-Tek personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Din-Tek. Product names and markings noted herein may be trademarks of their respective owners.

## Material Category Policy

**Din-Tek Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Din-Tek documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Din-Tek Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Din-Tek documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**