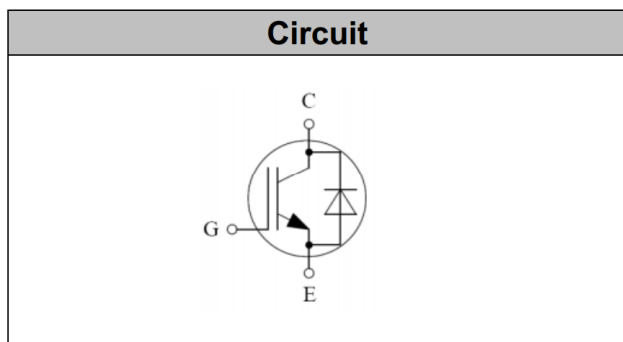


TO-220F Pin Configuration



IGBT Discrete

V_{CE}	650	V
I_C	10	A
$V_{CE(SAT)} I_C=15A$	1.45	V

Applications

- Motor Drives

Features

- Easy parallel switching capability due to positive temperature coefficient in V_{CEsat}
- Low V_{CEsat} , fast switching
- High ruggedness, good thermal stability
- Very tight parameter distribution

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-Emitter Breakdown Voltage	V_{CE}	650	V
DC Collector Current, limited by T_{jmax} $T_C=25^{\circ}C$ $T_C=100^{\circ}C$	I_C	30 15	A
Diode Forward Current, limited by T_{jmax} $T_C=25^{\circ}C$ $T_C=100^{\circ}C$	I_F	30 15	A
Continuous Gate-Emitter Voltage	V_{GE}	± 20	V
Pulsed Collector Current, $V_{GE}=15V$, t_p limited by T_{jmax}	I_{CM}	45	A
Power Dissipation, $T_C=25^{\circ}C$	P_{tot}	52	W
Operating Junction Temperature	T_j	-55...+175	$^{\circ}C$
Storage Temperature	T_s	-55...+150	$^{\circ}C$
Soldering Temperature, wave soldering 1.6mm(0.063in.) from case for 10s	-	300	$^{\circ}C$

Thermal Resistance

Parameter	Symbol	Max. Value	Unit
IGBT Thermal Resistance, Junction - Case	$R_{th(j-c)}$	2.9	K/W
Diode Thermal Resistance, Junction - Case	$R_{th(j-c)}$	4.6	K/W
Thermal Resistance, Junction - Ambient	$R_{th(j-a)}$	65	K/W

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Collector-Emitter Breakdown Voltage	BV_{CES}	$V_{GE}=0V, I_C=250\mu A$	650	-	-	V
Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=250\mu A$	4.5	5.8	6.5	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=15A$ $T_j=25^\circ\text{C},$ $T_j=150^\circ\text{C}$	- -	1.45 1.8	1.95 -	V
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=650V, V_{GE}=0V$ $T_j=25^\circ\text{C},$	-	-	10	μA
Gate-Emitter Leakage Current	I_{GES}	$V_{CE}=0V, V_{GE}=\pm 20V$	-	-	250	nA
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V,$ $f=1\text{MHz}$	-	1310	-	pF
Output Capacitance	C_{oes}		-	66	-	
Reverse Transfer Capacitance	C_{res}		-	19	-	
Gate Charge	Q_G	$V_{CC}=300V, I_C=15A,$ $V_{GE}=15V$	-	57	-	nC
Gate-Emitter Charge	Q_{GE}		-	8.2	-	
Gate-Collector Charge	Q_{GC}		-	23	-	

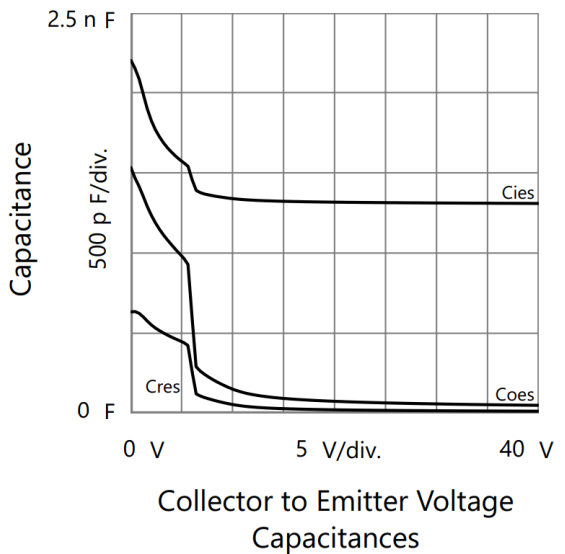
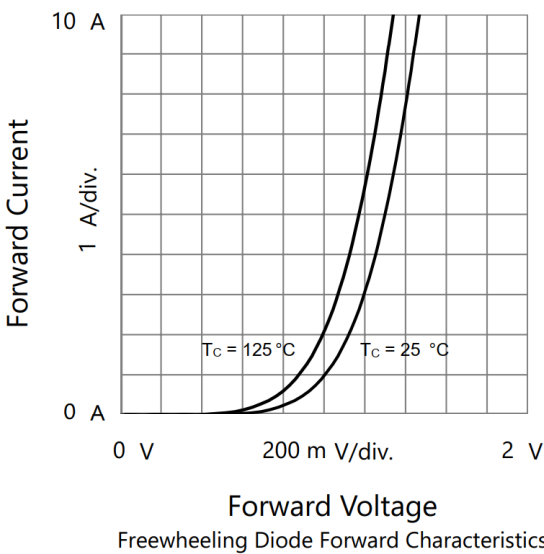
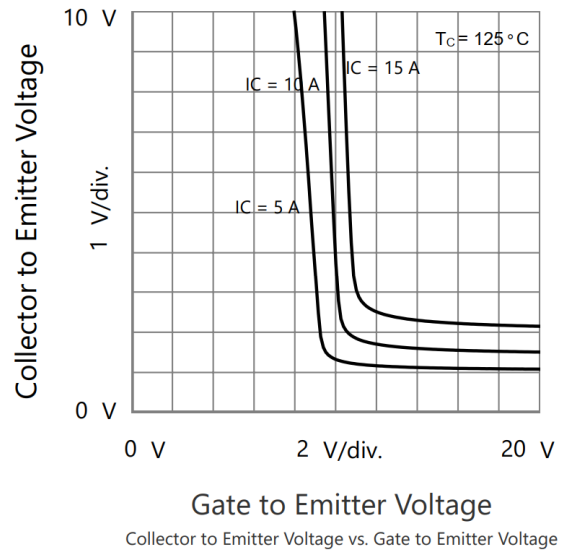
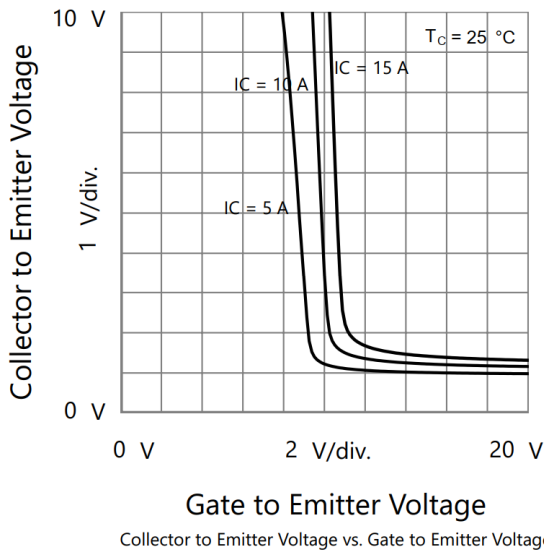
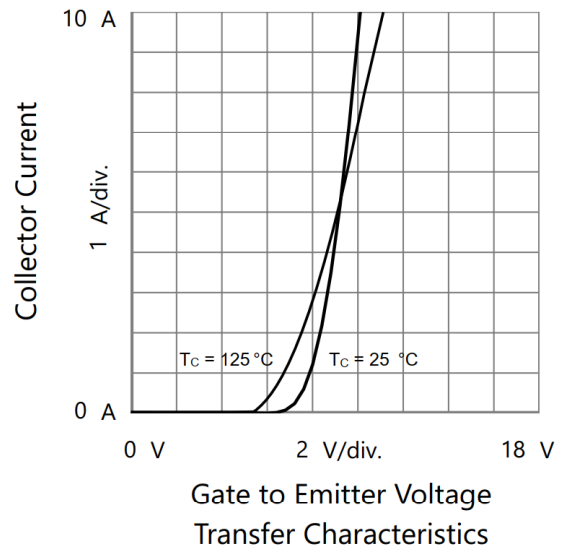
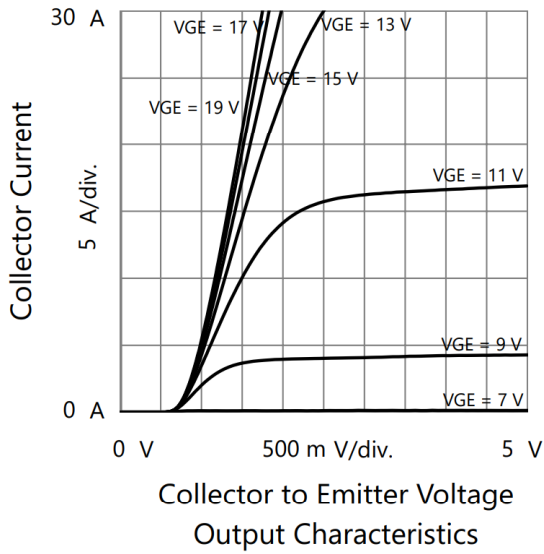
Switching Characteristic, Inductive Load ($T_j = 25^\circ\text{C}$ unless otherwise specified):

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-on Delay Time	$t_{d(on)}$	$V_{CC} = 400\text{V}, I_C = 15\text{A},$ $V_{GE} = 15\text{V}$ $R_g = 10\Omega$	-	66	-	ns
Rise Time	t_r		-	35	-	ns
Turn-on Energy	E_{on}		-	0.28	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	126	-	ns
Fall Time	t_f		-	57	-	ns
Turn-off Energy	E_{off}		-	0.3	-	mJ

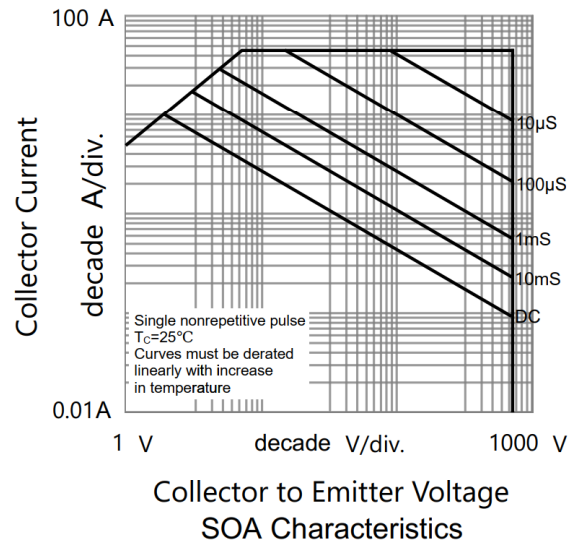
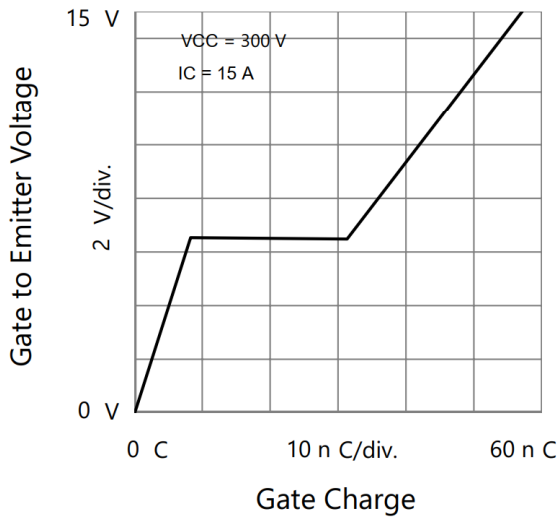
Electrical Characteristics of the DIODE ($T_j = 25^\circ\text{C}$ unless otherwise specified):

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_F	$I_F = 15\text{A}$	-	1.5	-	V
Reverse Recovery Time	T_{rr}	$T_C = 25^\circ\text{C}, I_F = 15\text{A},$ $V_R = 400\text{V}$ $d_i/d_t = 570\text{A}/\mu\text{s}$	-	82	-	ns
Reverse Recovery Charge	Q_{rr}		-	0.4	-	μC

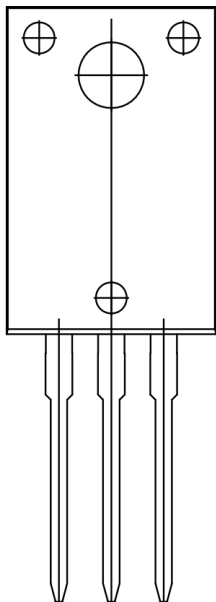
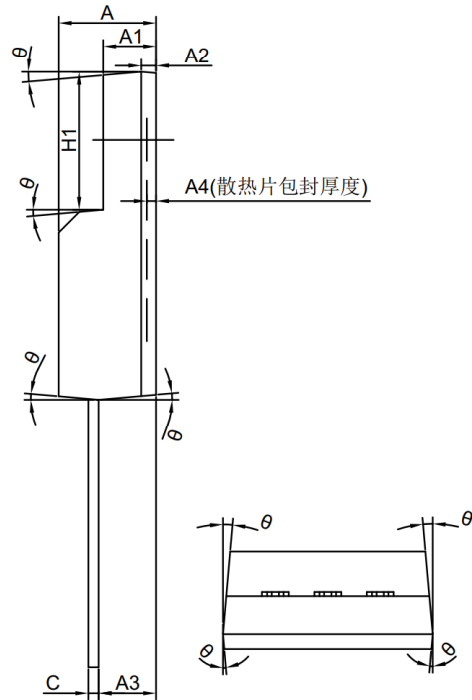
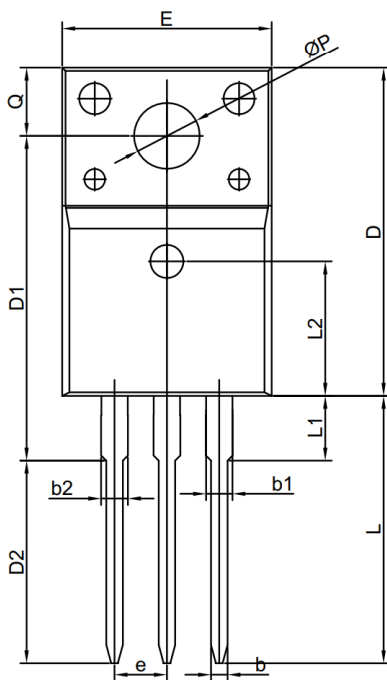
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



TO-220F-3L PACKAGE OUTLINE



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	4.30	4.72	5.10
A1	2.25	2.56	2.90
A2	0.72 REF		
A3	2.28	2.78	3.50
A4	0.45 MAX		
b	0.65	-	0.95
b1	1.00	-	1.55
b2	-	-	1.55
c	0.40	0.50	0.65
D	15.47	15.87	16.37
D1	15.35	15.75	16.25
E	9.76	10.16	10.76
e	2.54 BSC		
H1	6.28	6.68	7.08
L	12.48	12.98	13.50
L1	2.90	-	3.80
L2	2.54 BSC		
$\varnothing P$	2.98	3.18	3.50
Q	3.00	-	3.60
θ	3°	5°	7°

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