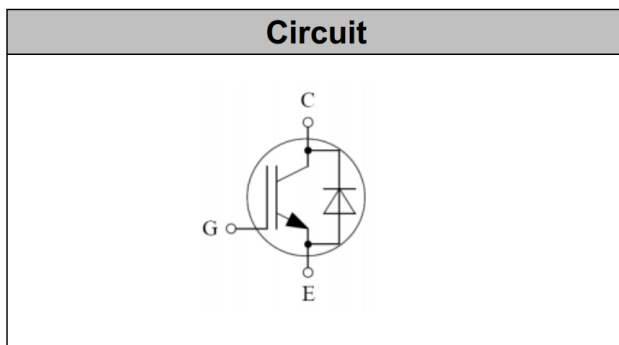


**TO-3P Pin Configuration**



## IGBT Discrete

$V_{CE}$	<b>650</b>	<b>V</b>
$I_C$	<b>60</b>	<b>A</b>
$V_{CE(SAT)} I_C=60A$	<b>2.0</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)

## Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-Emitter Breakdown Voltage	$V_{CE}$	650	V
DC Collector Current, limited by $T_{jmax}$ $T_C=25^{\circ}C$ $T_C=100^{\circ}C$	$I_C$	120 60	A
Diode Forward Current, limited by $T_{jmax}$ $T_C=25^{\circ}C$ $T_C=100^{\circ}C$	$I_F$	120 60	A
Continuous Gate-Emitter Voltage	$V_{GE}$	$\pm 20$	V
Pulsed Collector Current, $V_{GE}=15V$ , $t_p$ limited by $T_{jmax}$	$I_{CM}$	180	A
Power Dissipation , $T_j=175^{\circ}C, T_c=25^{\circ}C$	$P_{tot}$	280	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	$R_{th(j-c)}$	0.45	K/W
Diode Thermal Resistance, Junction - Case	$R_{th(j-c)}$	1.17	K/W
Thermal Resistance, Junction - Ambient	$R_{th(j-a)}$	40	K/W

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

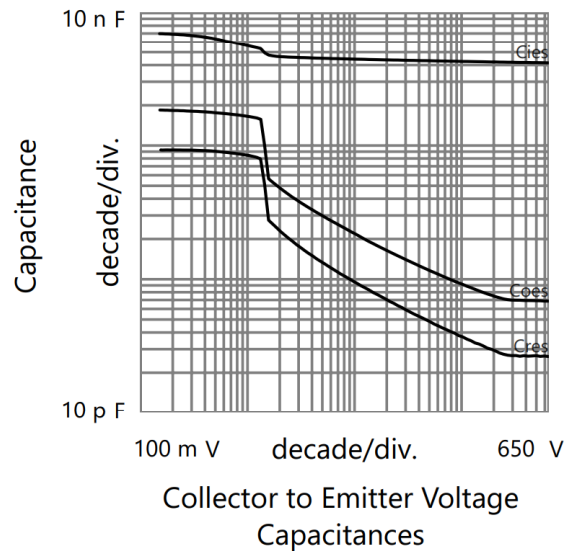
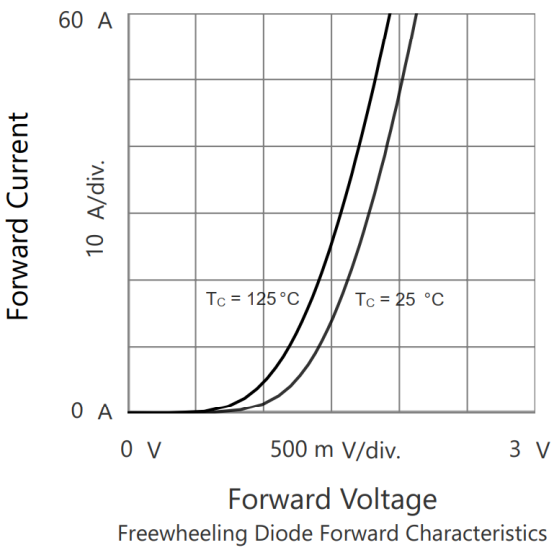
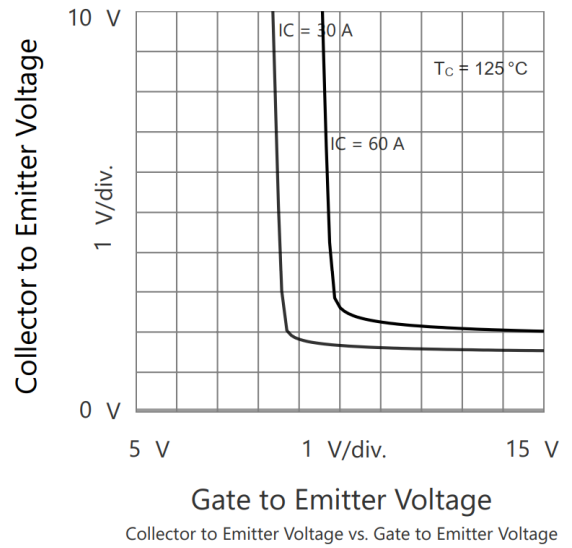
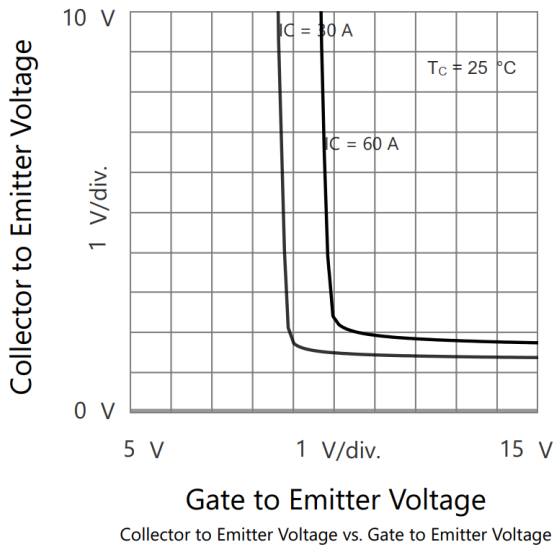
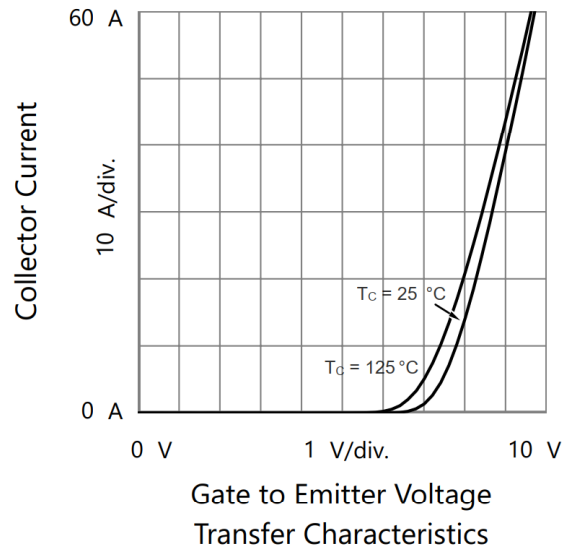
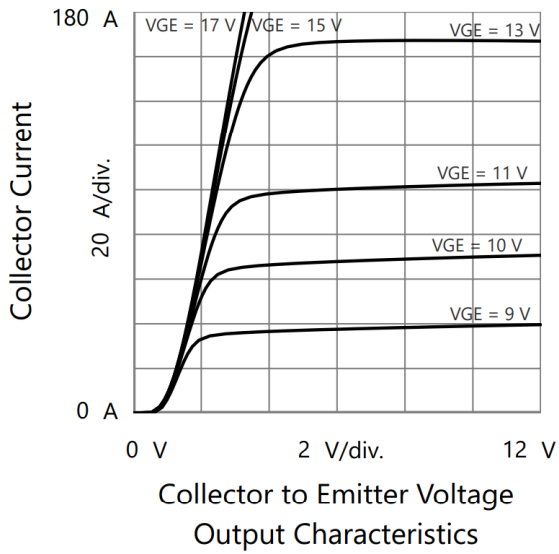
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Collector-Emitter Breakdown Voltage	$BV_{CES}$	$V_{GE}=0V, I_C=250\mu A$	650		-	V
Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=250\mu A$	4	5.0	6.5	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=60A$ $T_j=25^\circ\text{C}$ , $T_j=125^\circ\text{C}$ $T_j=150^\circ\text{C}$		2.0 2.50 2.90	2.50	V
Zero Gate Voltage Collector Current	$I_{CES}$	$V_{CE}=650V, V_{GE}=0V$ $T_j=25^\circ\text{C}$ , $T_j=150^\circ\text{C}$			0.2 4.00	mA
Gate-Emitter Leakage Current	$I_{GES}$	$V_{CE}=0V, V_{GE}=\pm 20V$			400	nA
Input Capacitance	$C_{ies}$	$V_{CE}=25V, V_{GE}=0V,$ $f=1\text{MHz}$	-	5120	-	pF
Output Capacitance	$C_{oes}$		-	140	-	
Reverse Transfer Capacitance	$C_{res}$		-	53	-	
Gate Charge	$Q_G$	$V_{CC}=400V, I_C=60A,$ $V_{GE}=15V$	-	212	-	nC
Gate-Emitter Charge	$Q_{GE}$		-	25	-	
Gate-Collector Charge	$Q_{GC}$		-	76	-	

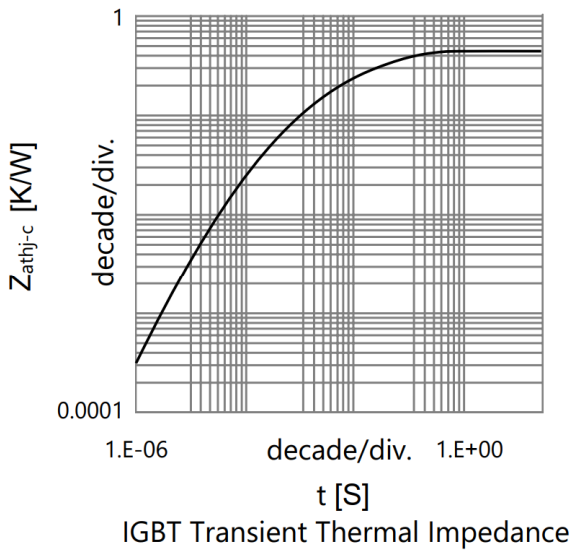
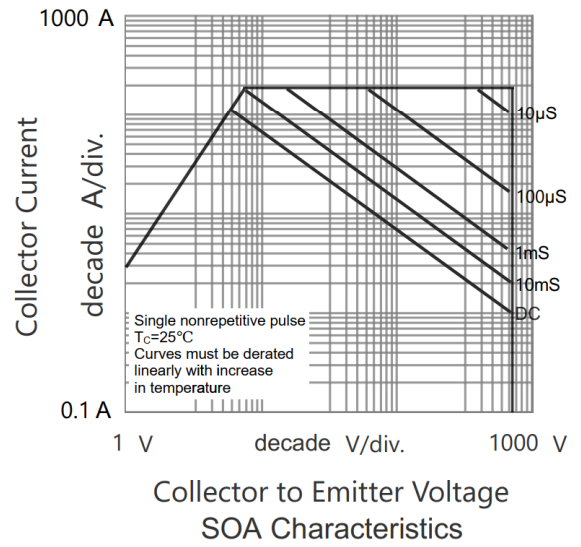
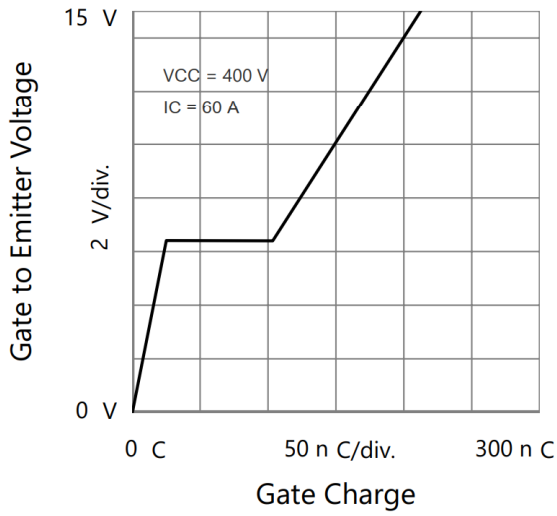
**Switching Characteristic, Inductive Load** ( $T_j = 25^\circ\text{C}$  unless otherwise specified):

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-on Delay Time	$t_{d(on)}$	$V_{CC} = 400\text{V}$ , $I_C = 60\text{A}$ , $V_{GE} = 15\text{V}$ $R_g = 12\Omega$	-	70	-	ns
Rise Time	$t_r$		-	160	-	ns
Turn-on Energy	$E_{on}$		-	3.8	-	mJ
Turn-off Delay Time	$t_{d(off)}$		-	190	-	ns
Fall Time	$t_f$		-	140	-	ns
Turn-off Energy	$E_{off}$		-	1.5	-	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	$V_F$	$I_F = 30\text{A}$	-	1.8	-	V
Reverse Recovery Time	$T_{rr}$	$I_F = 30\text{A}$ , $V_R = 400\text{V}$ , $di/dt = 200\text{A}/\mu\text{s}$ ,	-	36	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	80	-	nC
Reverse Recovery Energy	$E_{rec}$		-	0.15		mJ





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