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## DATA SHEET

PART NO. : PC50H060AA

REV : A / 0

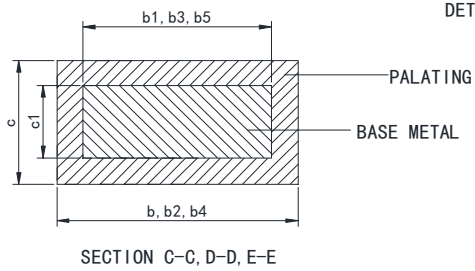
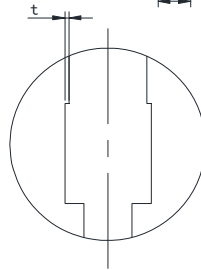
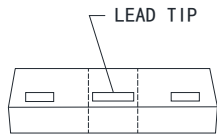
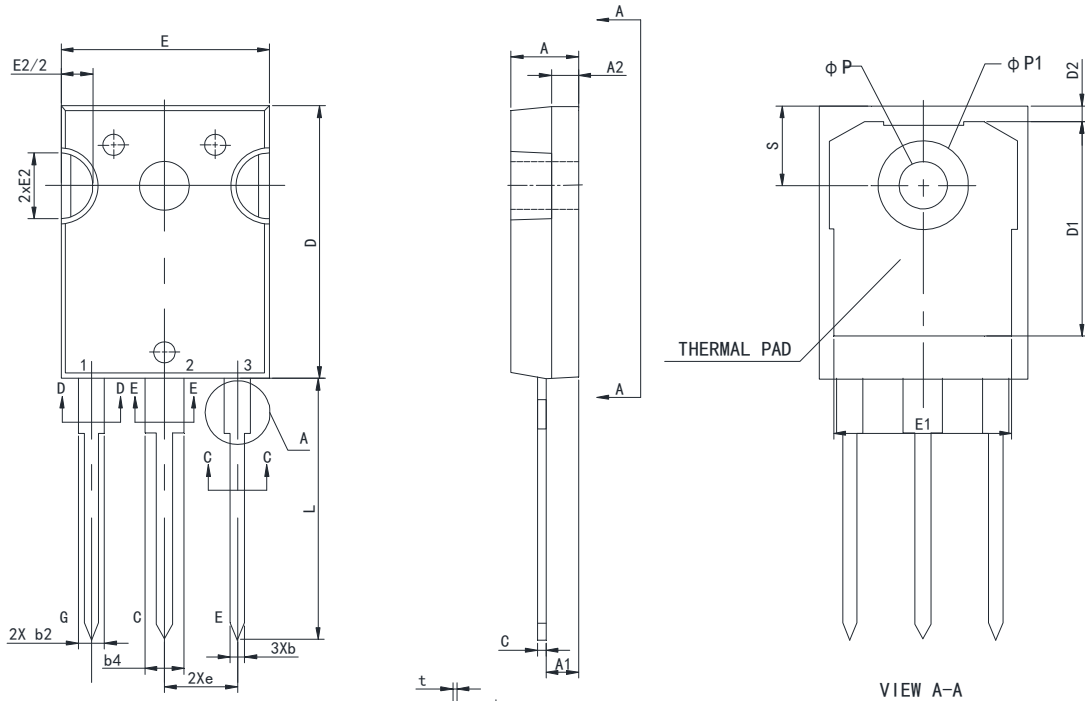
CUSTOMER'S APPROVAL : \_\_\_\_\_ DCC : \_\_\_\_\_

DRAWING NO. : DS-91P-22-0017

DATE : 2023-06-07

Page : 1

### Package Dimensions



DIM	MILLIMETERS(mm)		MILLIMETERS(inch)	
	MIN	MAX	MIN	MAX
A	4.9	5.1	0.193	0.201
A1	2.31	2.51	0.091	0.099
A2	1.9	2.1	0.075	0.083
b	1.16	1.26	0.046	0.050
b1	1.15	1.22	0.045	0.048
b2	1.96	2.06	0.077	0.081
b3	1.95	2.02	0.077	0.080
b4	2.96	3.06	0.117	0.120
b5	2.95	3.02	0.116	0.119
c	0.59	0.66	0.023	0.026
c1	0.58	0.62	0.023	0.024
D	20.90	21.10	0.823	0.831
D1	16.25	16.85	0.640	0.663
D2	1.05	1.35	0.041	0.053
E	15.75	15.90	0.620	0.626
E1	13.26	—	0.552	—
E2	4.90	5.10	0.193	0.201
e	5.44BSC		0.214BSC	
L	19.80	20.10	0.780	0.791
L1	—	4.30	—	0.169
φP	3.50	3.70	0.138	0.146
φP1	—	7.40	—	0.291
S	6.05	6.25	0.238	0.246
t	0.00	0.15	0.000	0.006



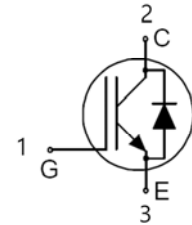
## Trench Field-Stop Technology IGBT

PC50H060AA

REV:A / 0

## Features

Advanced Trench+FS IGBT technology  
 Low Collector-Emitter Saturation voltage  
 With anti-parallel fast recovery diode  
 Maximum junction temperature:  $T_J = 175\text{ }^\circ\text{C}$

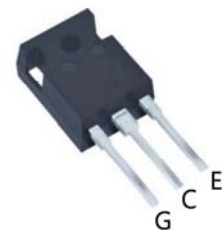


## Applications

Motor control

## Key Performance and Package Parameters

$V_{CE}$	$I_C$	$V_{CESAT}, T_{vj}=25^\circ\text{C}$	$T_{vjmax}$
600V	50A	1.9V	175°C



## Maximum Ratings

Symbol	Parameter	Condition	Value	Unit
$V_{CES}$	Collector-to-emitter voltage	$T_{vj}=25^\circ\text{C}$	600	V
$I_C$	DC Collector current	$T_C = 25^\circ\text{C}$	90	A
		$T_C = 100^\circ\text{C}$	50	
$I_{CRM}^{(2)}$	Pulsed Collector current	$T_{vj} \leq 175^\circ\text{C}$	200	A
$I_F$	Diode continuous forward current	$T_C = 25^\circ\text{C}$	90	A
		$T_C = 100^\circ\text{C}$	50	
$I_{FRM}^{(2)}$	Diode pulsed current	$T_{vj} \leq 175^\circ\text{C}$	200	A
$V_{GES}$	Gate to emitter voltage	$T_{vj}=25^\circ\text{C}$	$\pm 30$	V
$t_{sc}$	Short circuit withstand time	$V_{GE}=15\text{V}, V_{CC} \leq 400\text{V}$ $T_{vj}=25^\circ\text{C}$	10	$\mu\text{s}$
$P_{tot}$	Power dissipation	$T_C = 25^\circ\text{C}$	265	W
$T_{vj}$	Operating Junction Temperature	-	-40~+ 175	$^\circ\text{C}$
$T_{stg}$	Storage Temperature Range	-	-50~ + 150	$^\circ\text{C}$

Pulse width limited by  $T_{vjmax}$  / Value limited by bondwire

## Thermal Data

Symbol	Parameter	Max.	Unit
$R_{th(J-C)}$	IGBT thermal resistance Junction-to-Case	0.56	K/W
$R_{th(J-C)}$	FRD thermal resistance Maximum Junction-to-Case	0.7	K/W
$R_{th(J-A)}$	Thermal resistance Junction-to-Ambient	40	K/W



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## Static Electrical Characteristic

Symbol	Parameter	Test conditions	Value			Units
			Min	Typ	Max	
$V_{(BR)CES}$	Collector - Emitter breakdown voltage	$V_{GE} = 0V, I_c = 1mA, T_{vj} = 25^\circ C$	600	-	-	V
$V_{CE(sat)}$	Collector-Emitter Saturation voltage	$V_{GE} = 15V, I_c = 50A, T_{vj} = 25^\circ C$	-	1.9	2.3	V
		$V_{GE} = 15V, I_c = 50A, T_{vj} = 175^\circ C$	-	2.2	-	
$V_{GE(th)}$	Gate threshold voltage	$V_{GE} = V_{CE}, I_c = 5mA, T_{vj} = 25^\circ C$	4.8	5.5	6	V
$V_F$	Diode Forward Voltage	$V_{GE} = 0V, I_F = 50A, T_{vj} = 25^\circ C$	1.2	1.5	1.8	V
		$V_{GE} = 0V, I_F = 50A, T_{vj} = 175^\circ C$	-	1.3	-	
$I_{GES}$	Gate to Emitter Leakage current	$V_{GE} = 20V, V_{CE} = 0V, T_{vj} = 175^\circ C$	-	-	100	nA
$I_{CES}$	Zero gate voltage collector current	$V_{CE} = 600V, V_{GE} = 0V, T_{vj} = 175^\circ C$	-	-	300	$\mu A$
$R_{Gin}$	Integrated gate resistor	-	-	0	-	$\Omega$

## Dyanmic Recovery Characteristic

Symbol	Parameter	Test conditions	Value			Units
			Min	Typ	Max	
$C_{ies}$	Input capacitance	$V_{GE} = 0V, V_{CE} = 25V, f = 1MHz, T_{vj} = 25^\circ C$	-	3010	-	Pf
$C_{oes}$	Output capacitance		-	251	-	
$C_{res}$	Reverse transfer capacitance		-	137	-	
$Q_g$	Total gate charge	$I_c = 50A, V_{CE} = 480V, V_{GE} = 15V, T_{vj} = 25^\circ C$	-	222	-	nC
$Q_{ge}$	Gate to emitter charge		-	30	-	
$Q_{gc}$	Gate to collector charge		-	146	-	
$I_{SC}$	Short circuit collector current	$T_{vj} = 25^\circ C, V_{CC} = 400V, V_{GE} = 15V$	-	170	-	A

### Switching Characteristic Inductive Load

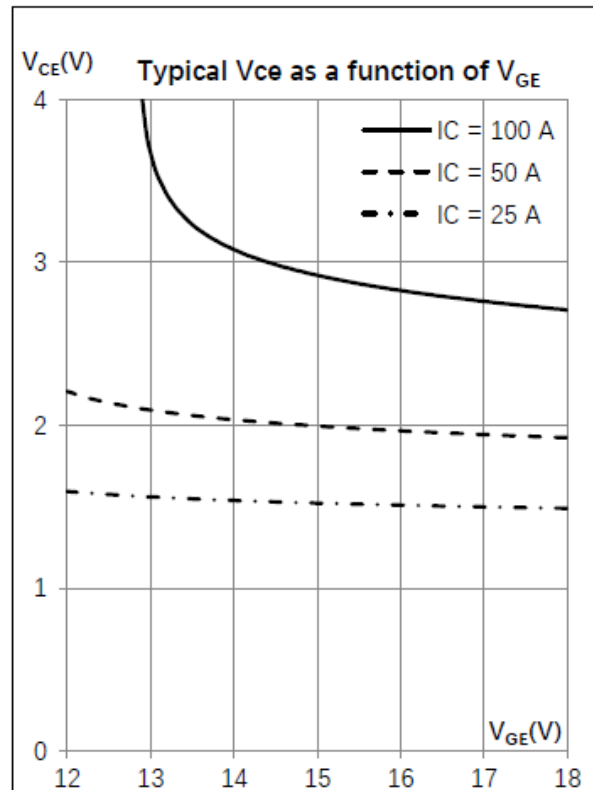
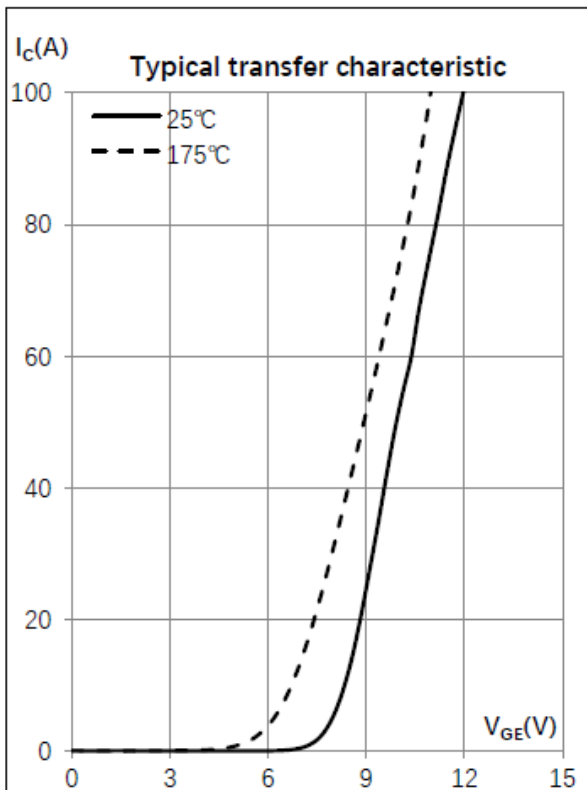
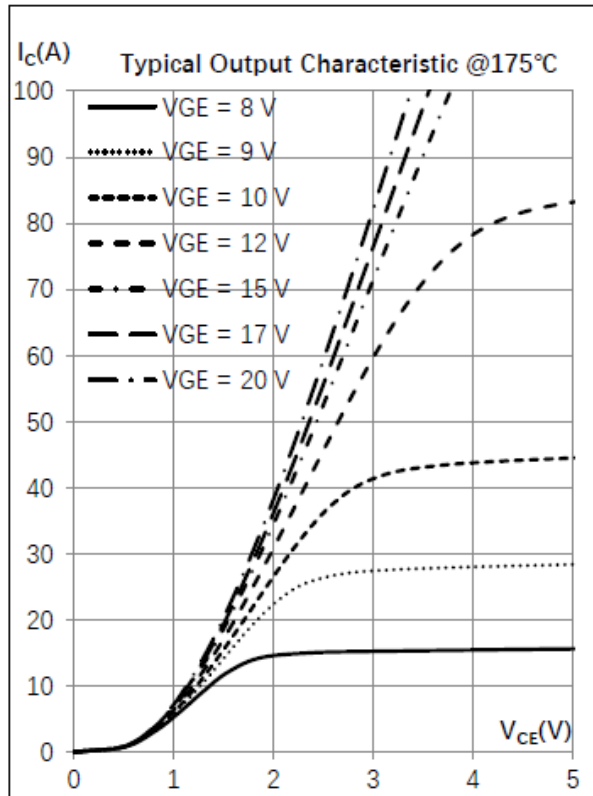
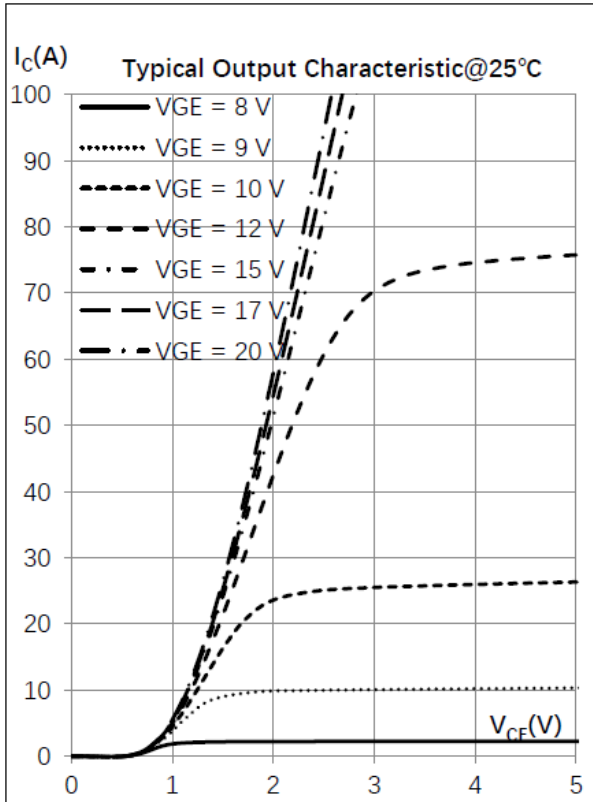
#### IGBT Characteristic

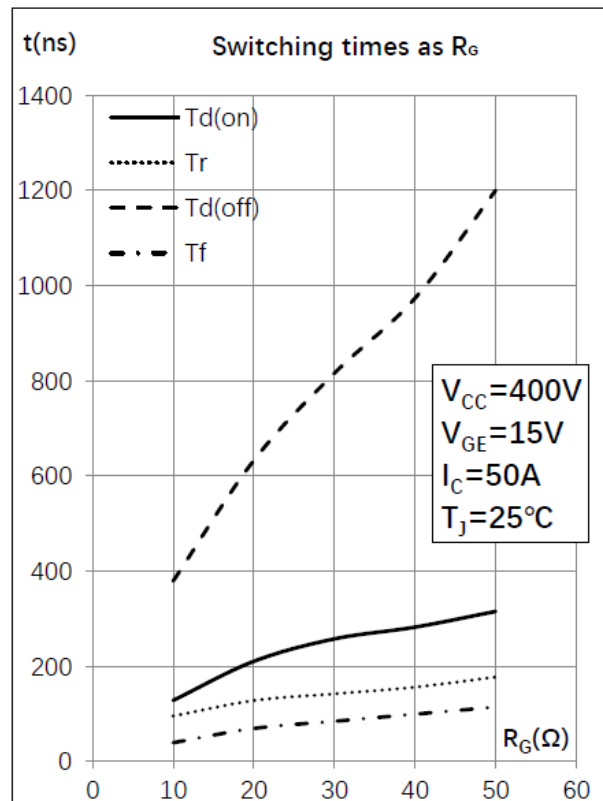
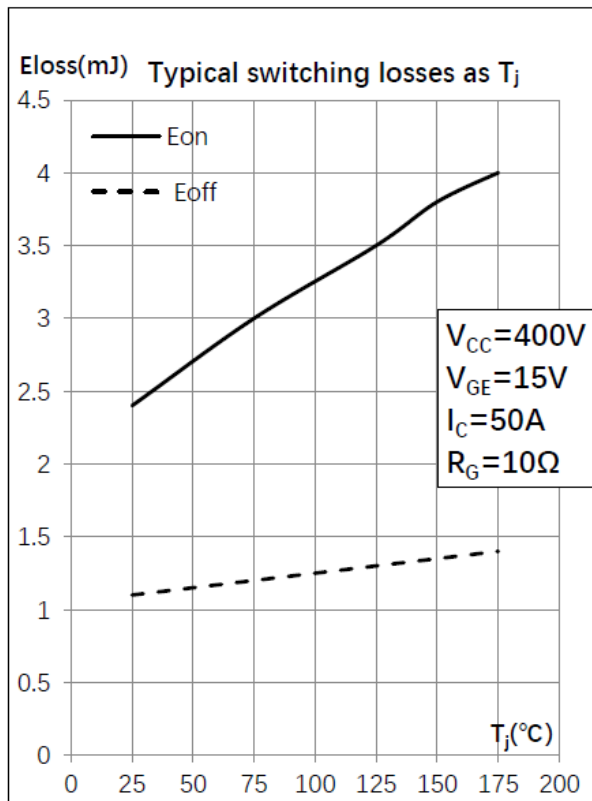
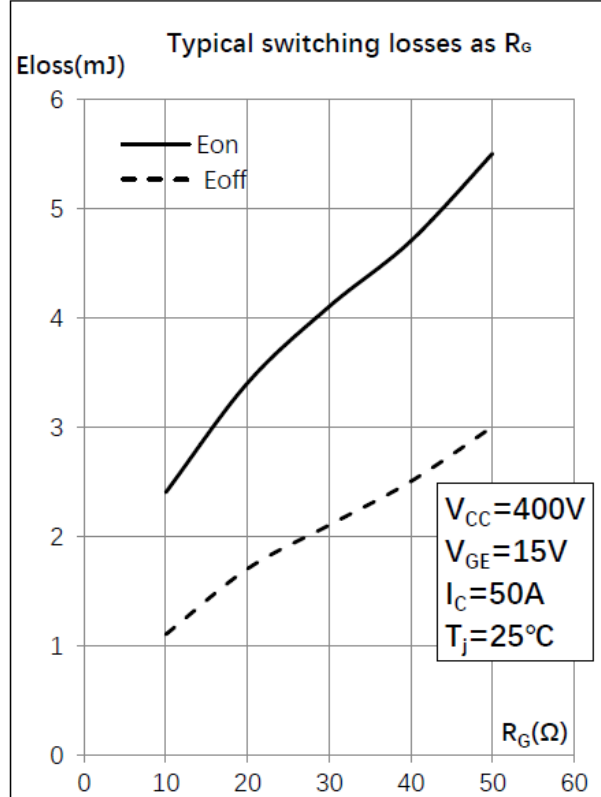
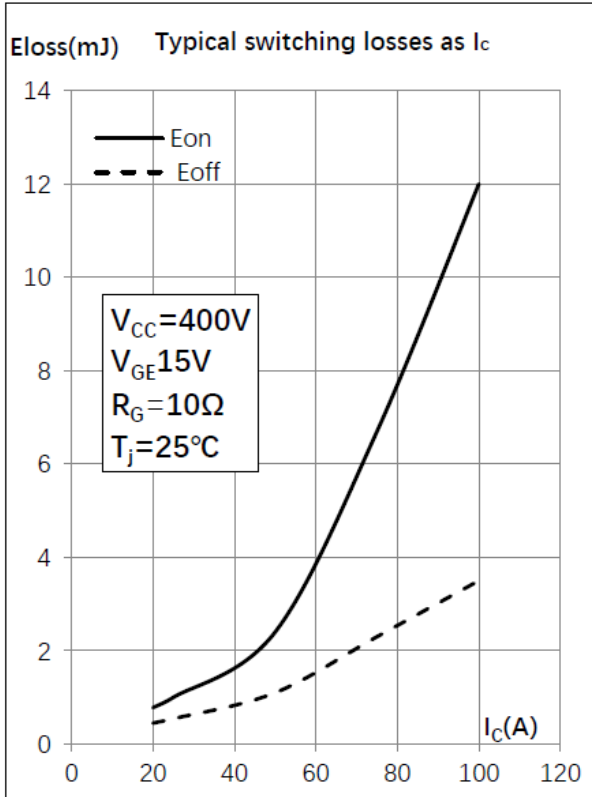
Symbol	Parameter	Test conditions	Value			Units	
			Min	Typ	Max		
Td(on)	Turn-On Delay Time	VCC=400V IC=50A RG(on)=10Ω RG(off)=10Ω C=0nF VGE=15V L load=150μH	Tvj=25°C	-	128	-	ns
			Tvj=175°C	-	150	-	
Tr	Rise time		Tvj=25°C	-	46	-	ns
			Tvj=175°C	-	67	-	
Td(off)	Turn-Off Delay Time		Tvj=25°C	-	379	-	ns
			Tvj=175°C	-	469	-	
tf	Turn-Off Fall Time		Tvj=25°C	-	39	-	ns
			Tvj=175°C	-	52	-	
Eon	Turn-on switch loss		Tvj=25°C	-	2.2	-	mJ
			Tvj=175°C	-	2.6	-	
Eoff	Turn-off switch loss	Tvj=25°C	-	1.1	-	mJ	
		Tvj=175°C	-	1.4	-		

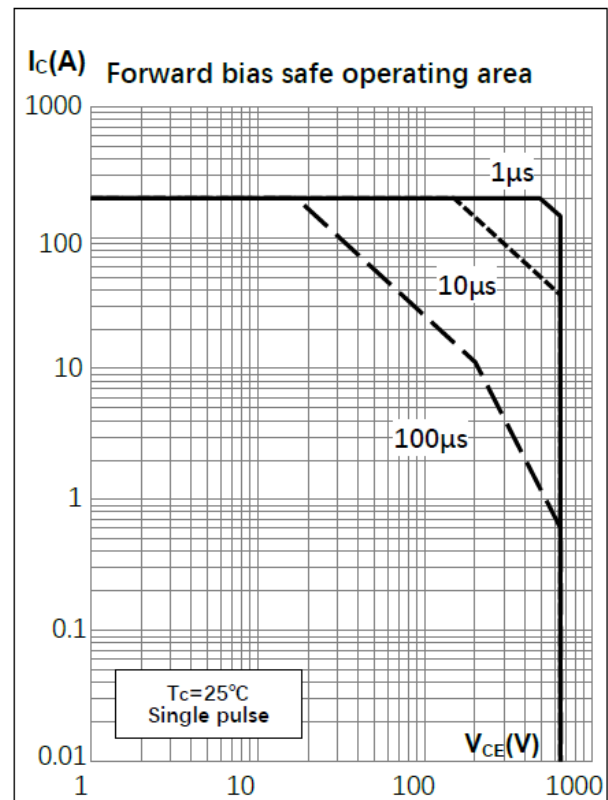
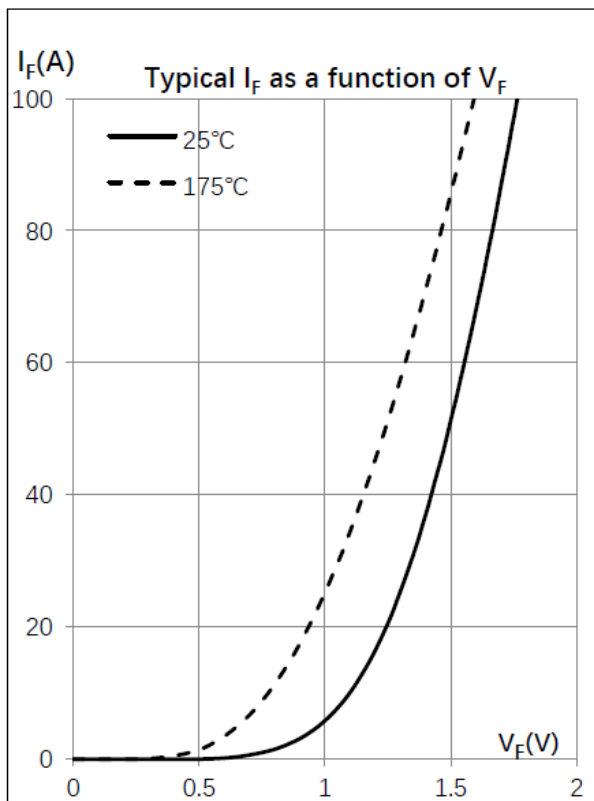
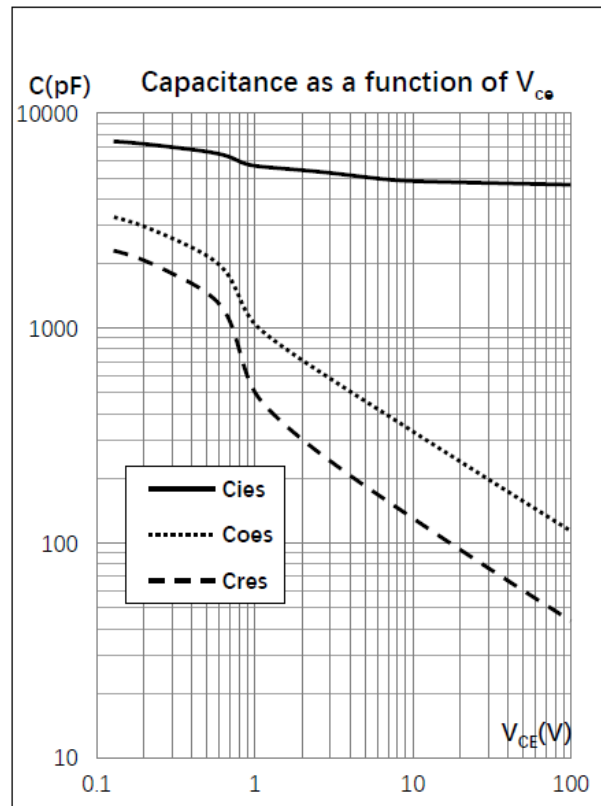
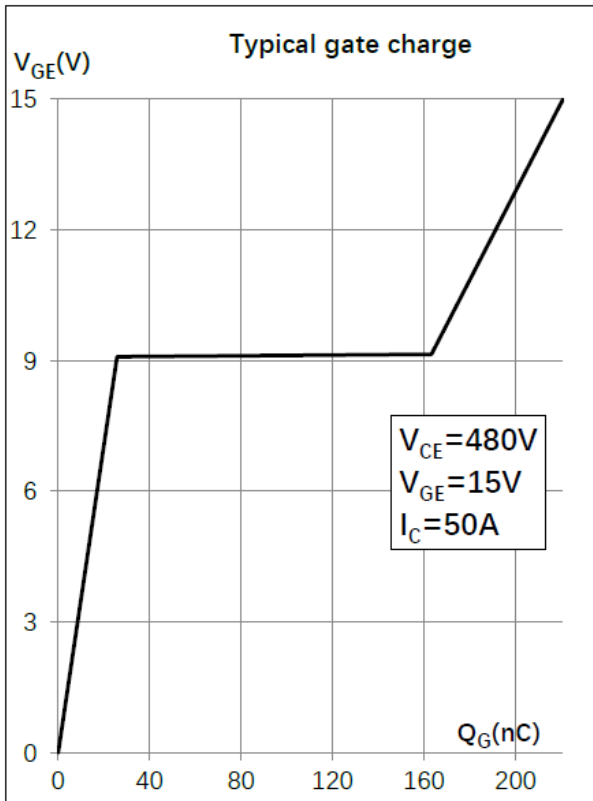
#### Diode Characteristic

Symbol	Parameter	Test conditions	Value			Units	
			Min	Typ	Max		
trr	Diode Reverse Recovery Time	IF = 50A VR=400V diF/dt=-400A/μs	Tvj=25°C	-	85	-	ns
			Tvj=175°C	-	110	-	
Qrr	Diode Reverse Recovery Charge		Tvj=25°C	-	0.6	-	μC
			Tvj=175°C	-	2.3	-	
Irrm	Peak reverse recovery current		Tvj=25°C	-	12	-	A
			Tvj=175°C	-	20	-	
dirr/dt	Peak rate of irr		Tvj=25°C	-	274	-	A/μs
			Tvj=175°C	-	310	-	
Erec	Diode Reverse Recovery loss		Tvj=25°C	-	0.9	-	mJ
			Tvj=175°C	-	1.4	-	

### Typical Characteristics











# Trench Field-Stop Technology IGBT

PC50H060AA

REV:A / 0

## ● PART NO. SYSTEM :

P C 15 H 120 A C

