

600V Trench and Fieldstop IGBT

PRODUCT SUMMARY

V_{CE} (V)	600	
I_C (A)	90 (TC=25 °C)	75 (TC=100 °C)
$V_{CE(sat)}$ (V)	1.7	
Q_g (nC)	175	
I_{CM} (A)	225	

FEATURES

- Very Low V_{CEsat}
- Low turn-off losses
- High speed switching
- Maximum junction temperature 175°C
- Ultra low gate charge (Q_g)
- Avalanche energy rated (UIS)



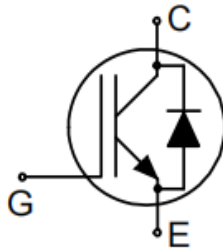
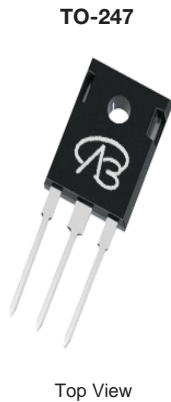
RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Telecommunications
 - Server and telecom power supplies
- Lighting
 - High-intensity discharge (HID)
 - Fluorescent ballast lighting
- Consumer and computing
 - ATX power supplies
- Industrial
 - Welding
 - Battery chargers
- Renewable energy
 - Solar (PV inverters)
- Switch mode power supplies (SMPS)

Package pin definition

- Pin1 G - Gate
- Pin2 C & backside - Collector
- Pin3 E - Emitter



ABSOLUTE MAXIMUM RATINGS ($T_C = 25\text{ °C}$, unless otherwise noted)

PARAMETER				SYMBOL	LIMIT	UNIT
Collector-Emitter Voltage				V _{CE}	600	V
Gate-Emitter Voltage				V _{GE}	±30	
Continuous Collector Current (T _J = 150 °C)	V _{GE} at 15 V	T _C = 25 °C	I _C	150	A	
		T _C = 100 °C		75		
Pulsed Collector Current ^a				I _{CM}	225	A
Diode Forward Current ^b				I _F	90	
Maximum Power Dissipation		T _C = 25 °C	P _D	400	W	
		T _C = 100 °C		220	W	
Operating Junction and Storage Temperature Range				T _J , T _{stg}	-55 to +175	°C
Short Circuit Withstand Time _{TC=150}	VGE= 15V, VCE 400V		tsc	3	μs	
Short Circuit Withstand Time _{TC=100}	VGE= 15V, VCE 330V			5		
Soldering Recommendations (Peak Temperature) ^c	for 10 s			260	°C	

Notes

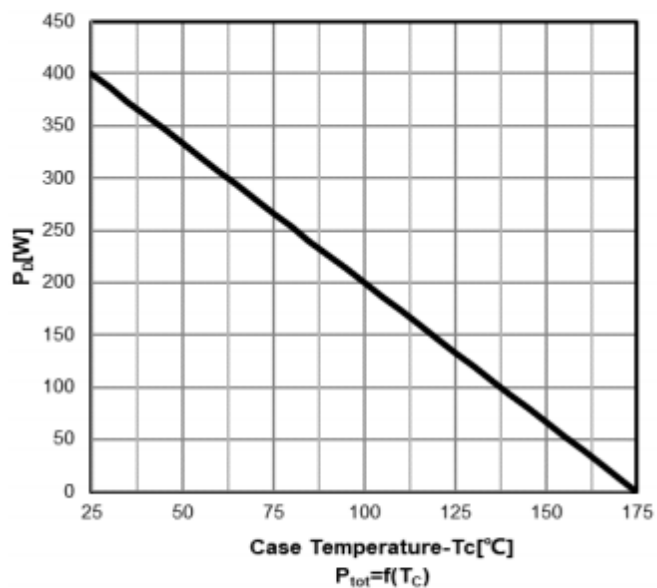
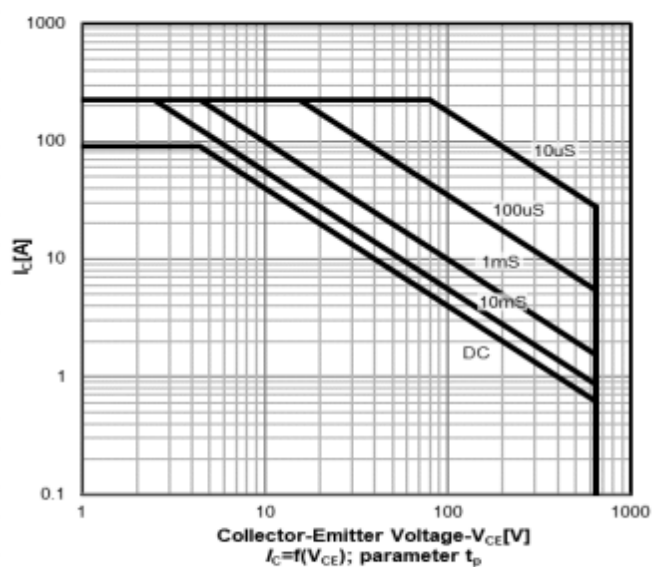
- a. Repetitive rating; pulse width limited by maximum junction temperature.
- b. Current limited by maximum junction temperature.
- c. 1.6 mm from case.

THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R_{thJA}	-	40	°C/W
Maximum Junction-to-Case	R_{thJC}	-	0.5	

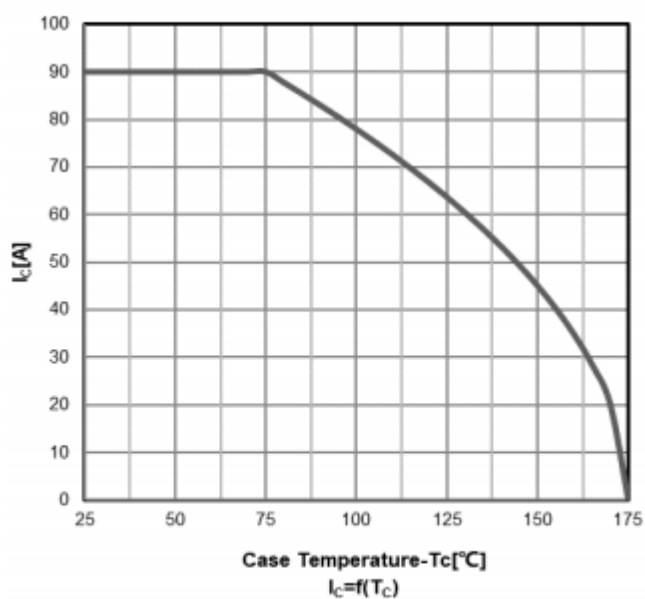
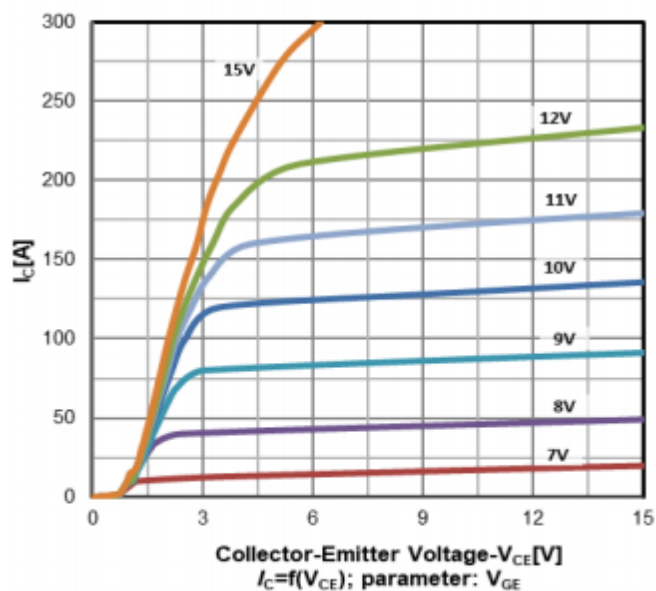
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Collector-Emitter Breakdown Voltage	BV _{CE}	V _{GE} = 0 V, I _C = 250 μA V _{GE} = 0 V, I _C = 1 mA		600 600	- -	- -	V
Gate-Source Threshold Voltage (N)	V _{GE(th)}	V _{CE} = V _{GE} , I _D = 250 μA		4	5	6	V
Zero Gate Voltage Collector Current	I _{CES}	V _{CE} =480 V,V _{GE} = 0 V,T _J = 25 °C		-	1	20	μA
		V _{CE} = 480 V,V _{GE} = 0 V,T _J = 150 °C		-	1000	-	μA
Gate-Emitter Leakage Current	I _{GES}	V _{CE} = 0 V, V _{GS} = ± 2 0 V		-	-	100	nA
Collector-Emitter Saturation Voltage	V _{CE(sat)}	V _{GE} = 15 V	I _C = 75 A	-	1.7	2.1	V
Forward Transconductance	g _{fs}	V _{CE} = 20 V, I _C = 75 A		-	40	-	S
Dynamic							
Input Capacitance	C _{ies}	V _{GE} = 0 V, V _{CE} = 25 V, f = 500 KHz		-	4600	-	pF
Output Capacitance	C _{oes}			-	235	-	
Reverse Transfer Capacitance	C _{res}			-	72	-	
Turn-on Energy	E _{on}	V _{CE} = 480 V , V _{GE} = 0 /15V, I _C = 75 A, R _g = 10Ω		-	0.62	-	ns
Turn-off Energy	E _{off}			-	0.31	-	
Total Gate Charge	Q _g	V _{GE} = 15 V	I _C = 75 A, V _{CE} = 480 V	-	175	-	nC
Gate-Emitter Charge	Q _{ge}			-	14	-	
Gate to Collector Charge	Q _{gc}			-	33	-	
Turn-On Delay Time	t _{d(on)}	V _{CE} = 480 V , V _{GE} = 0 /15V, I _C = 75 A, R _g = 10Ω		-	60	-	ns
Rise Time	t _r			-	43	-	
Turn-Off Delay Time	t _{d(off)}			-	184	-	
Fall Time	t _f			-	30	-	
Internal emitter inductance measured 5 mm	L _E			-	13	-	nH
Diode Characteristics							
Diode Forward Current	I _F	IGBT symbol showing the integral reverse junction diode		-	-	75	A
Pulsed Diode Forward Current	I _{FM}			-	-	225	
Diode Forward Voltage	V _F	I _F = 30 A		-	1.65	2.0	V
Reverse Recovery Time	t _{rr}	T _J = 25 °C, I _F = 30 A, dI _F /dt = 200 A/μs, V _R = 480 V		-	200	-	ns
Reverse Recovery Charge	Q _{rr}			-	85	-	μC
Reverse Recovery Current	I _{RRM}			-	13	-	A

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

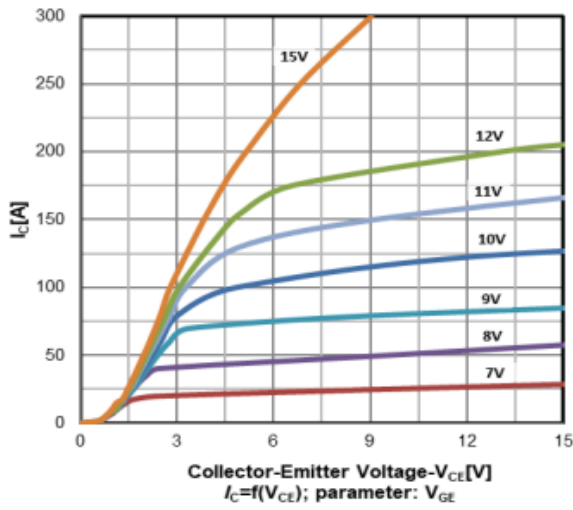
Power dissipation

Safe operating area $T_a=25$ °C

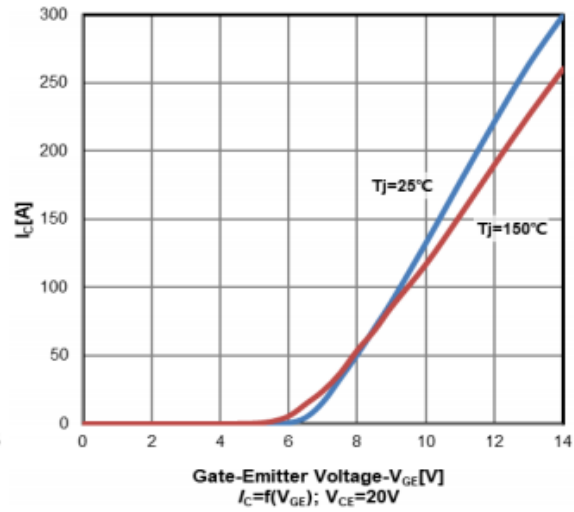
Collector current as a function of Case temperature

Typ. Output characteristics $T_j=25$ °C

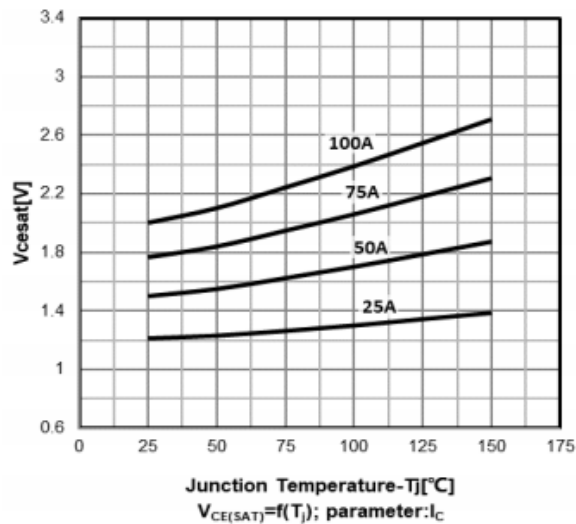
Typ. Output characteristics
 $T_J = 150^\circ\text{C}$



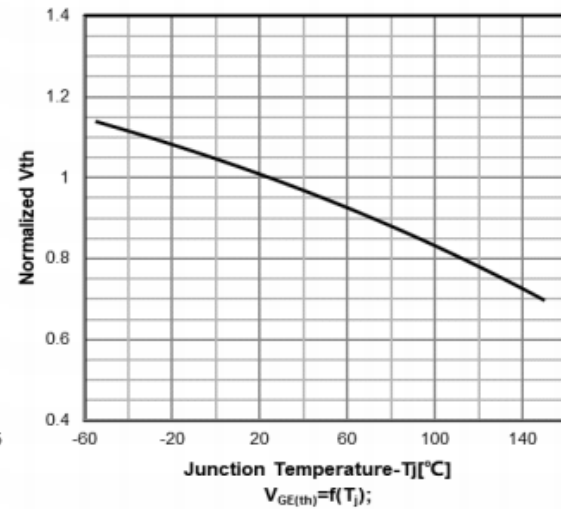
Typ. Transfer characteristics



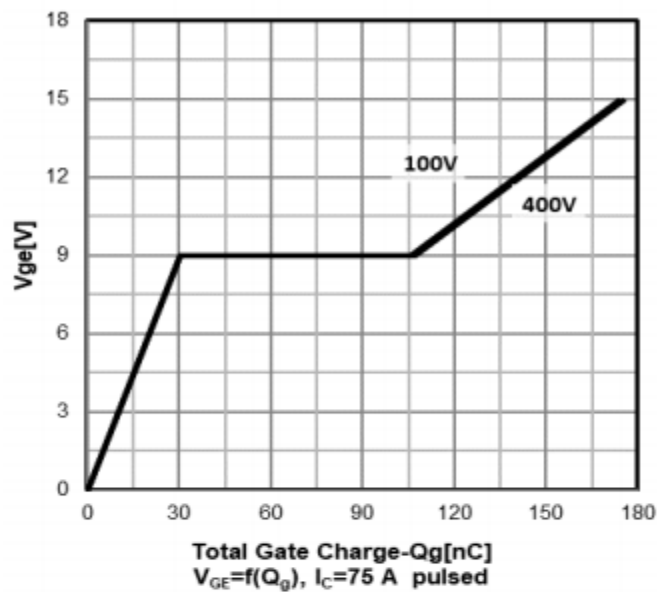
Typ. Collector-emitter saturation voltage as a function of junction temperature ($V_{GE} = 15\text{V}$)



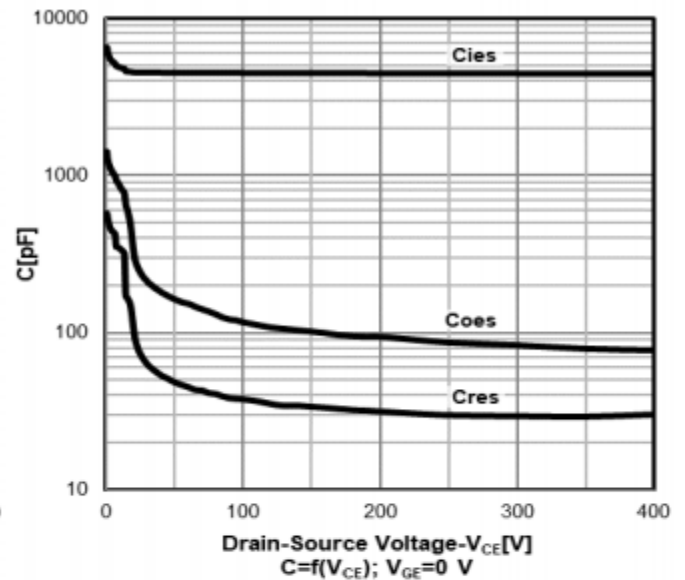
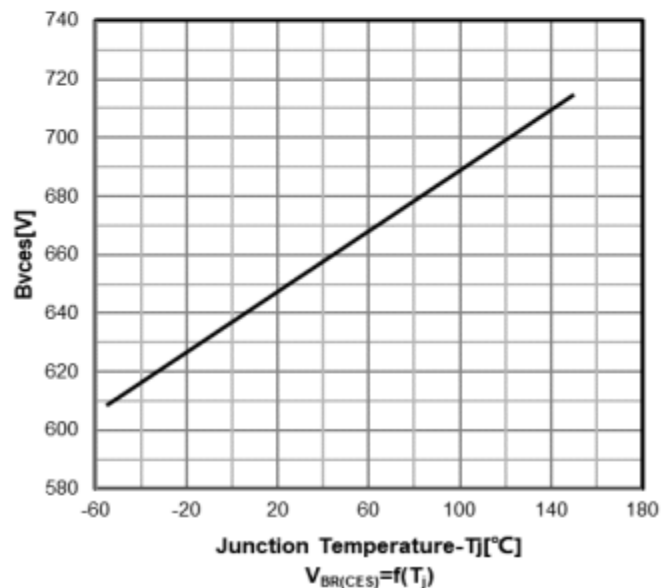
Normalized $V_{GE(th)}$ vs. temperature



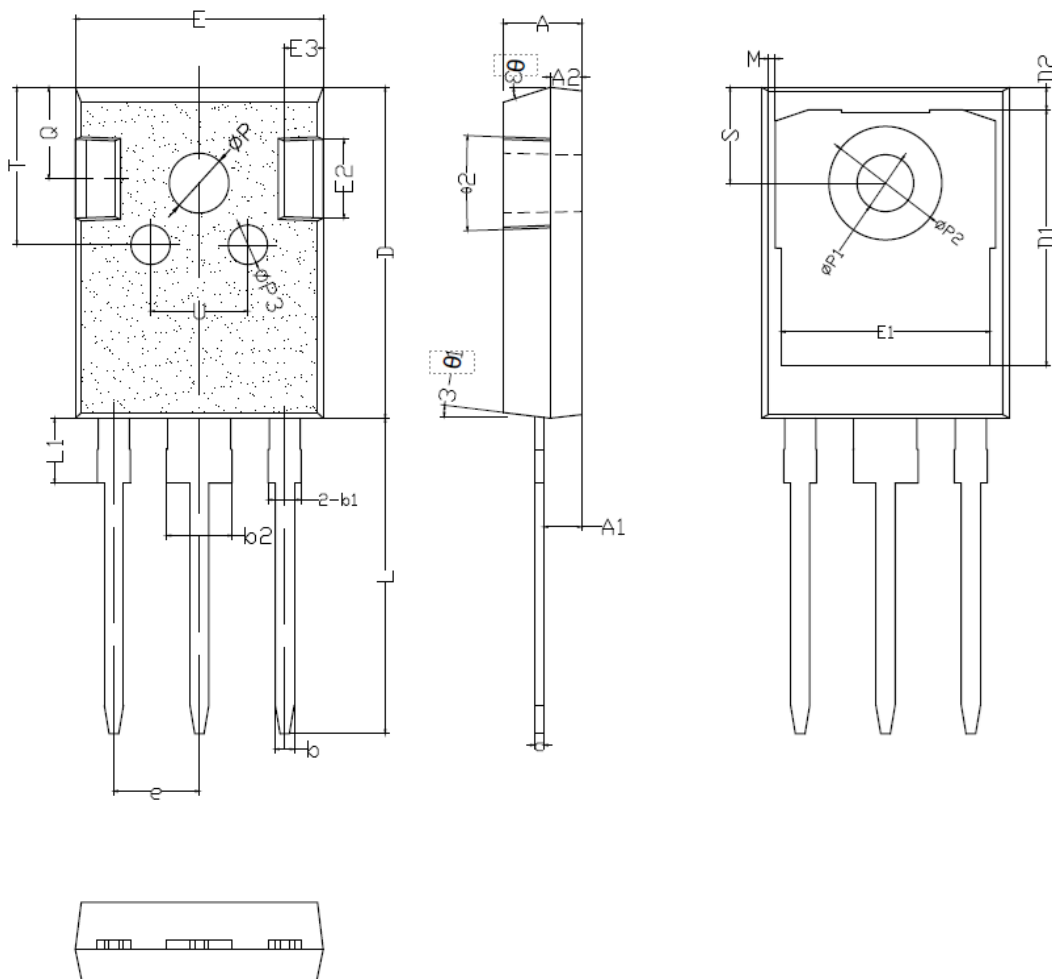
Gate charge characteristics



Capacitance characteristics

Collector-emitter breakdown voltage
vs. temperature

TO-247 PACKAGE OUTLINE DIMENSIONS



SYMBOL	mm		
	MIN	NOM	MAX
*A	4.90	5.00	5.10
*A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
*b	1.15	1.20	1.25
*b1	1.95	2.10	2.25
*b2	2.95	3.10	3.25
*c	0.55	0.60	0.65
*D	20.90	21.00	21.10
D1	16.35	16.55	16.75
D2	1.05	1.20	1.35

*E	15.70	15.80	15.90
E1	13.10	13.25	13.40
E2	4.85	4.95	5.10
E3	2.40	2.50	2.60
*e	5.40	5.44	5.48
*L	19.80	19.98	20.15
*L1	-	-	4.30
*ΦP	3.40	3.50	3.60
*ΦP1	6.90	7.10	7.30
ΦP2	2.40	2.50	2.60
ΦP3	2.40	2.50	2.60
Q	5.60	5.80	6.00
*S	6.05	6.15	6.25
T	9.80	10.00	10.20
U	6.00	6.20	6.40
θ1	5°	7°	9°
θ2	1°	3°	5°
θ3	13°	15°	17°

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