

600V Trench and Fieldstop IGBT

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

FEATURES

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

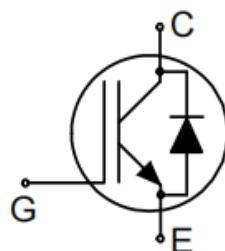


RoHS
COMPLIANT
HALOGEN
FREE

TO-247



Top View



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 ($T_C = 25^\circ\text{C}$, unless otherwise noted)					
PARAMETER		SYMBOL	LIMIT	UNIT	
Collector-Emitter Voltage		V_{CE}	600	V	
		V_{GE}	± 30		
Continuous Collector Current ($T_J = 150^\circ\text{C}$)	V_{GE} at 15 V	I_C	150	A	
			75		
Pulsed Collector Current ^a		I_{CM}	225		
Diode Forward Current ^b		I_F	90	A	
Maximum Power Dissipation		P_D	400	W	
			220		
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to +175	°C	
Short Circuit Withstand Time $T_C=150$	$V_{GE} = 15\text{V}, V_{CE} = 400\text{V}$	tsc	3	μs	
Short Circuit Withstand Time $T_C=100$	$V_{GE} = 15\text{V}, V_{CE} = 330\text{V}$		5		
Soldering Recommendations (Peak Temperature) ^c		for 10 s	260	°C	

Notes

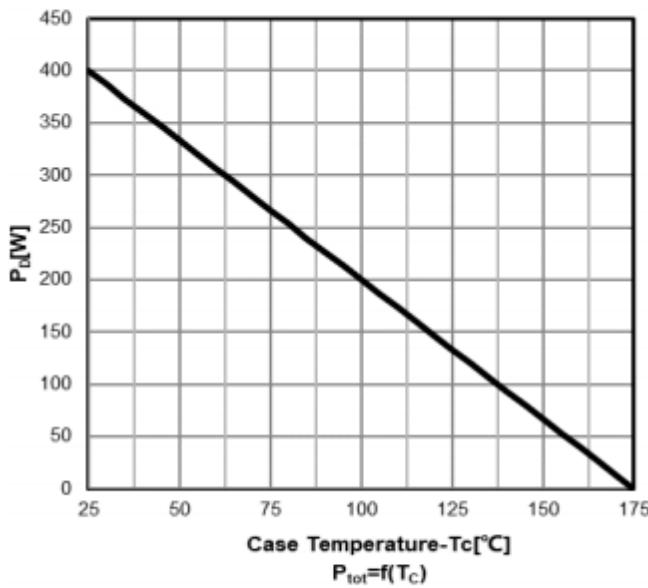
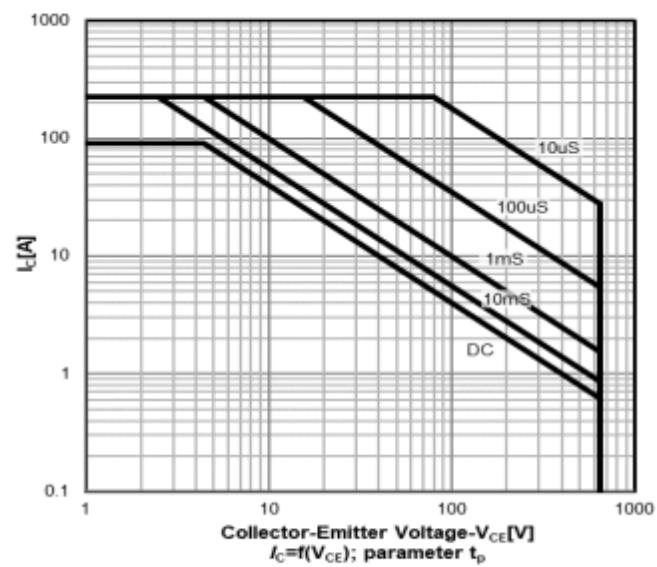
- Repetitive rating; pulse width limited by maximum junction temperature.
- Current limited by maximum junction temperature.
- 1.6 mm from case.

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

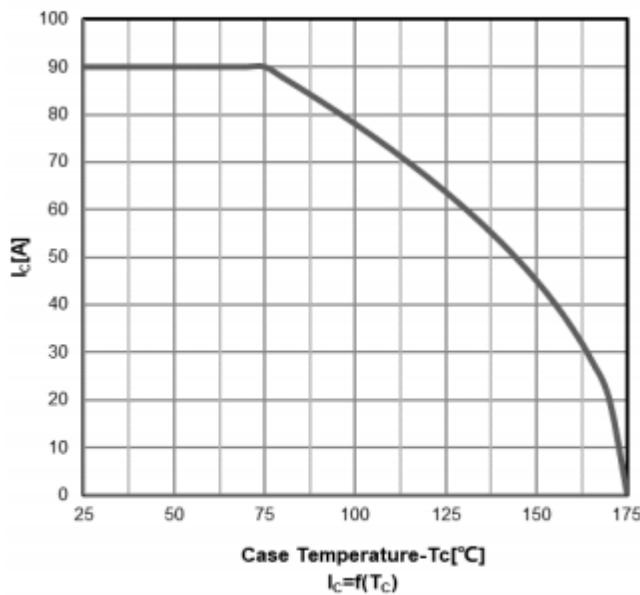
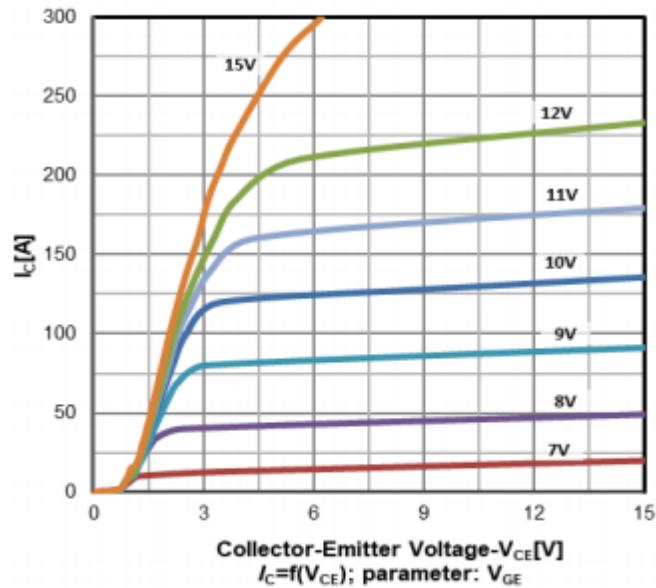
SPECIFICATIONS ($T_J = 25^{\circ}\text{C}$, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Static							
Collector-Emitter Breakdown Voltage	BV_{CE}	$\text{V}_{\text{GE}} = 0 \text{ V}$, $I_{\text{C}} = 250 \mu\text{A}$	$\text{V}_{\text{GE}} = 0 \text{ V}$, $I_{\text{C}} = 1 \text{ mA}$	600 600	- -	- -	V
Gate-Source Threshold Voltage (N)	$\text{V}_{\text{GE}(\text{th})}$	$\text{V}_{\text{CE}} = \text{V}_{\text{GE}}$, $I_{\text{D}} = 250 \mu\text{A}$		4	5	6	V
Zero Gate Voltage Collector Current	I_{CES}	$\text{V}_{\text{CE}} = 480 \text{ V}$, $\text{V}_{\text{GE}} = 0 \text{ V}$, $T_J = 25^{\circ}\text{C}$	$\text{V}_{\text{CE}} = 480 \text{ V}$, $\text{V}_{\text{GE}} = 0 \text{ V}$, $T_J = 150^{\circ}\text{C}$	-	1	20	μA
Gate-Emitter Leakage Current	I_{GES}	$\text{V}_{\text{CE}} = 0 \text{ V}$, $\text{V}_{\text{GS}} = \pm 2 \text{ V}$		-	-	100	nA
Collector-Emitter Saturation Voltage	$\text{V}_{\text{CE}(\text{sat})}$	$\text{V}_{\text{GE}} = 15 \text{ V}$	$I_{\text{C}} = 75 \text{ A}$	-	1.7	2.1	V
Forward Transconductance	g_{fs}	$\text{V}_{\text{CE}} = 20 \text{ V}$	$I_{\text{C}} = 75 \text{ A}$	-	40	-	S
Dynamic							
Input Capacitance	C_{ies}	$\text{V}_{\text{GE}} = 0 \text{ V}$, $\text{V}_{\text{CE}} = 25 \text{ V}$, $f = 500 \text{ KHz}$		-	4600	-	pF
Output Capacitance	C_{oes}			-	235	-	
Reverse Transfer Capacitance	C_{res}			-	72	-	
Turn-on Energy	E_{on}	$\text{V}_{\text{CE}} = 480 \text{ V}$, $\text{V}_{\text{GE}} = 0 / 15 \text{ V}$, $I_{\text{C}} = 75 \text{ A}$, $R_g = 10\Omega$		-	0.62	-	ns
Turn-off Energy	E_{off}			-	0.31	-	
Total Gate Charge	Q_g	$\text{V}_{\text{GE}} = 15 \text{ V}$	$I_{\text{C}} = 75 \text{ A}$, $\text{V}_{\text{CE}} = 480 \text{ V}$	-	175	-	nC
Gate-Emitter Charge	Q_{ge}			-	14	-	
Gate to Collector Charge	Q_{gc}			-	33	-	
Turn-On Delay Time	$t_{\text{d(on)}}$	$\text{V}_{\text{CE}} = 480 \text{ V}$, $\text{V}_{\text{GE}} = 0 / 15 \text{ V}$, $I_{\text{C}} = 75 \text{ A}$, $R_g = 10\Omega$		-	60	-	ns
Rise Time	t_r		-	43	-		
Turn-Off Delay Time	$t_{\text{d(off)}}$		-	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	$I_F = 30 \text{ A}$		-	1.65	2.0	V
Reverse Recovery Time	t_{rr}	$T_J = 25^{\circ}\text{C}$, $I_F = 30 \text{ A}$, $dI_F/dt = 200 \text{ A}/\mu\text{s}$, $V_R = 480 \text{ V}$		-	200	-	ns
Reverse Recovery Charge	Q_{rr}			-	85	-	μC
Reverse Recovery Current	I_{RRM}			-	13	-	A

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

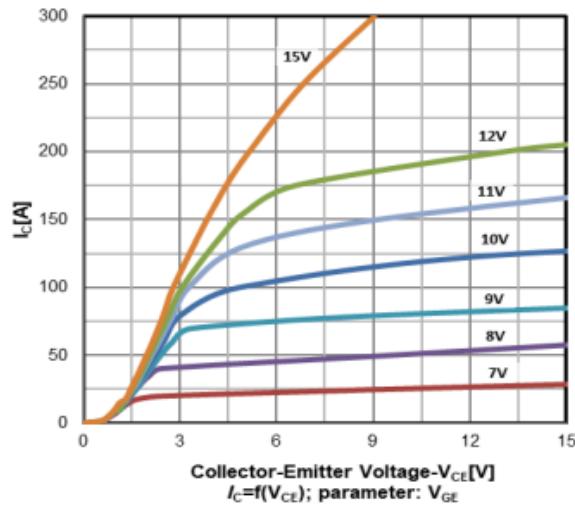
Power dissipation

Safe operating area $T_a=25$ °C

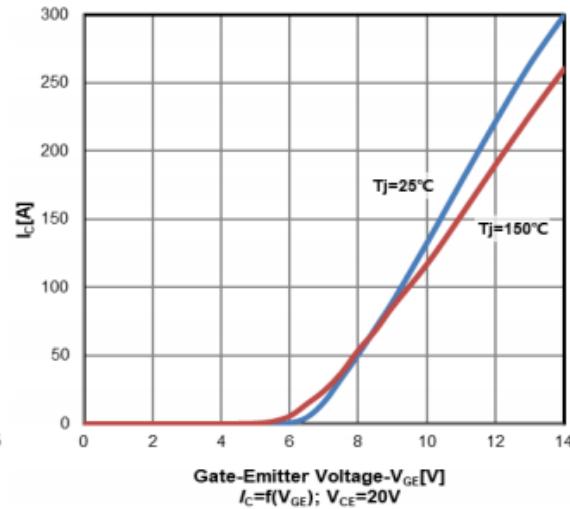
Collector current as a function of Case temperature

Typ. Output characteristics $T_j=25$ °C

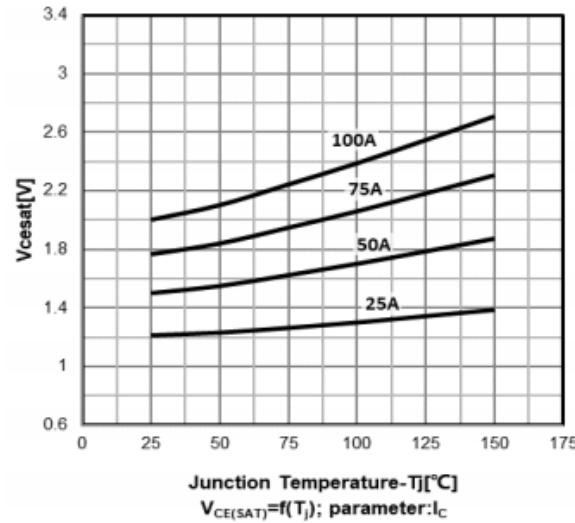
Typ. Output characteristics
 $T_j=150\text{ }^\circ\text{C}$



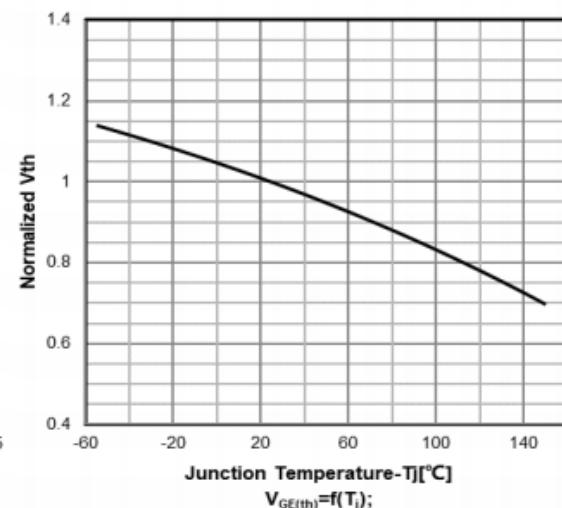
Typ. Transfer characteristics



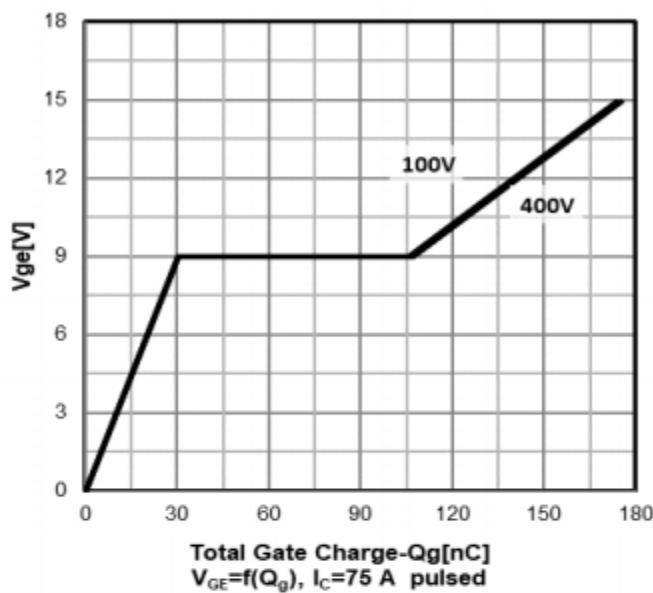
Typ. Collector-emitter saturation voltage as a function of junction temperature ($V_{GE}=15\text{V}$)



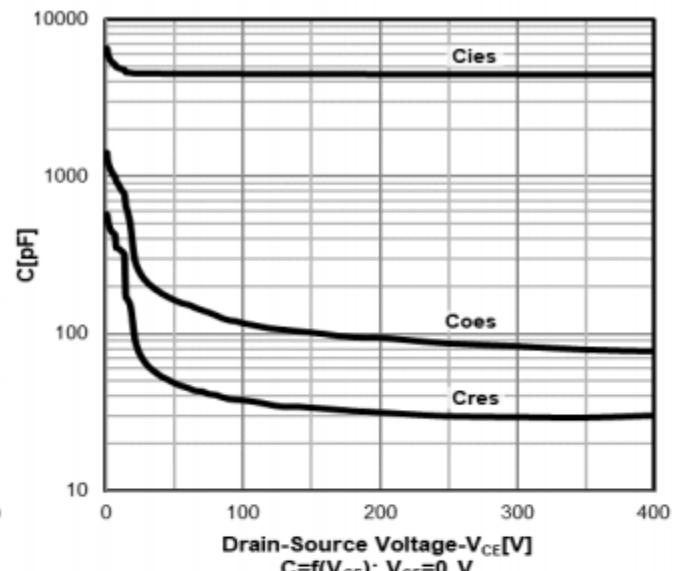
Normalized $V_{GE(\text{th})}$ vs. temperature



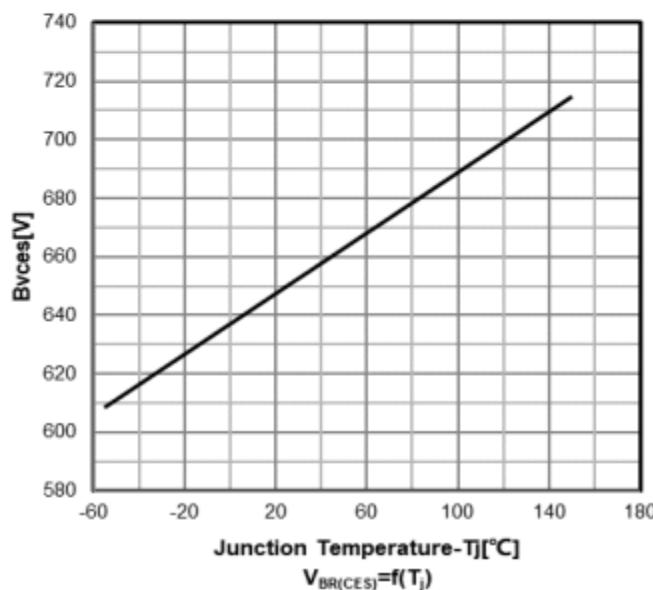
Gate charge characteristics



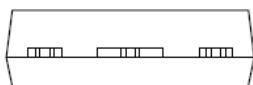
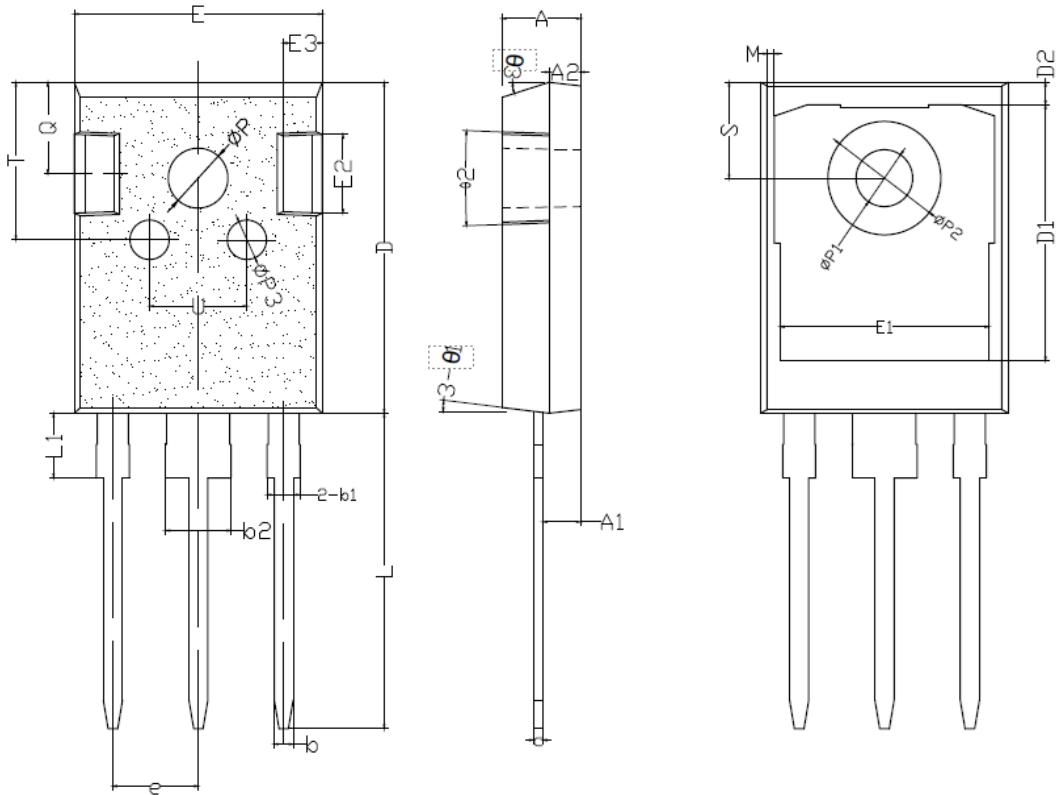
Capacitance characteristics



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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