AIGBG25N120S7

Short circuit rugged 1200 V TRENCHSTOP™ IGBT 7 technology

Final datasheet

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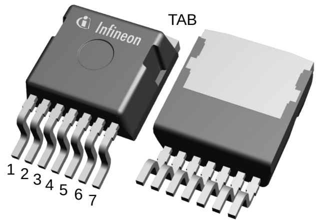


Halogen-free

RoHS

Features

- V_{CE} = 1200 V
- I_C = 25 A
- Very low V_{CEsat} = 1.65 V (typ.) at I_{Cnom} = 25 A, 25°C
- Short circuit robust t_{sc} = 4 µs at V_{CE} = 800 V, V_{GE} = 15 V
- Smooth switching characteristics
- Wide range of dv/dt controllability
- TO263-7 package with high creepage distance > 5.8 mm, 400 ≤ CTI < 600
- High reliability and operating lifetime

Potential applications

- xEV auxiliary drives
- Automotive HV heaters

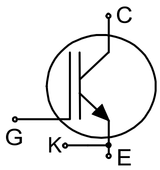
Product validation

- Qualified according to AEC-Q101 for automotive applications
- Qualified Reflow device according to JEDEC J-STD-020 MSL1

Description

Pin definition:

- Pin 1 - Gate
- Pin 2 - Kelvin Emitter
- Pin 3…7 - Emitter
- Tab - Collector



Type	Package	Marking
AIGBG25N120S7	PG-TO263-7-U01	AGBG25S7

Table of contents

1 Package

Table 1 Characteristic values

Parameter	Symbol	Note or test condition	Values Min.	Values Typ.	Values Max.	Unit
Storage temperature	T_{stg}		-55		150	°C
Soldering temperature	T_{sold}	reflow soldering (MSL1 according to JEDEC J-STD-020)			260	°C
IGBT thermal resistance, junction-case	$R_{th(j-c)}$			0.45	0.6	K/W

2 IGBT

Table 2 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Collector-emitter voltage[1)]	V_{CE}	T_{vj} = -40...175 °C		1200	V
DC collector current, limited by T_{vjmax}	I_C		T_c = 25 °C	55	A
			T_c = 100 °C	37	
Pulsed collector current, t_p limited by T_{vjmax}	I_{Cpulse}			75	A
Turn-off safe operating area		$V_{CE} \leq 1200$ V, $t_p \leq 1$ µs, $T_{vj} \leq 175$ °C		75	A
Gate-emitter voltage	V_{GE}			±20	V
Transient gate-emitter voltage	V_{GE}	$t_p \leq 0.5$ µs, $D < 0.01$		±25	V
Short-circuit withstand time	t_{SC}	$V_{CC} \leq 800$ V, V_{GE} = 15 V, Allowed number of short circuits < 1000, Time between short circuits ≥ 1.0 s, T_{vj} = 175 °C		4	µs
Power dissipation	P_{tot}		T_c = 25 °C	250	W
			T_c = 100 °C	125	

1) Tested at T_{vj}=25°C, verified by design/characterization over full temperature range

Table 3 Characteristic values

Parameter	Symbol	Note or test condition		Values Min.	Values Typ.	Values Max.	Unit
Collector-emitter saturation voltage	V_{CEsat}	I_C = 25 A, V_{GE} = 15 V	T_{vj} = 25 °C		1.65	2	V
			T_{vj} = 175 °C		2		
Gate-emitter threshold voltage	V_{GEth}	I_C = 0.49 mA, $V_{CE} = V_{GE}$		5.15	5.7	6.45	V

(table continues...)

Table 3 (continued) Characteristic values

Parameter	Symbol	Note or test condition		Values Min.	Typ.	Max.	Unit
Zero gate-voltage collector current	I_{CES}	V_{CE} = 1200 V, V_{GE} = 0 V	T_{vj} = 25 °C			40	µA
			T_{vj} = 175 °C		2000		
Gate-emitter leakage current	I_{GES}	V_{CE} = 0 V, V_{GE} = 20 V				100	nA
Transconductance	g_{fs}	I_C = 25 A, V_{CE} = 20 V, T_{vj} = 175 °C			9.3		S
Short-circuit collector current	I_{SC}	V_{CC} ≤ 800 V, V_{GE} = 15 V, t_{SC} ≤ 4 µs, Allowed number of short circuits < 1000, Time between short circuits ≥ 1.0 s	T_{vj} = 25 °C		158.2		A
			T_{vj} = 175 °C		126.5		
Input capacitance	C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 100 kHz			3.6		nF
Output capacitance	C_{oes}	V_{CE} = 25 V, V_{GE} = 0 V, f = 100 kHz			58		pF
Reverse transfer capacitance	C_{res}	V_{CE} = 25 V, V_{GE} = 0 V, f = 100 kHz			17		pF
Gate charge	Q_G	V_{CC} = 960 V, I_C = 25 A, V_{GE} = 0/15 V			158		nC
Turn-on delay time	$t_{d(on)}$	V_{CC} = 800 V, V_{GE}=15 V, $R_{G(on)}$ = 4.5 Ω, $R_{G(off)}$ = 4.5 Ω	T_{vj} = 25 °C, I_C = 25 A		12.9		ns
			T_{vj} = 175 °C, I_C = 25 A		14.5		
Rise time (inductive load)	t_r	V_{CC} = 800 V, V_{GE}=15 V, $R_{G(on)}$ = 4.5 Ω, $R_{G(off)}$ = 4.5 Ω	T_{vj} = 25 °C, I_C = 25 A		4.5		ns
			T_{vj} = 175 °C, I_C = 25 A		5.8		
Turn-off delay time	$t_{d(off)}$	V_{CC} = 800 V, V_{GE}=15 V, $R_{G(on)}$ = 4.5 Ω, $R_{G(off)}$ = 4.5 Ω	T_{vj} = 25 °C, I_C = 25 A		120		ns
			T_{vj} = 175 °C, I_C = 25 A		186		
Fall time (inductive load)	t_f	V_{CC} = 800 V, V_{GE}=15 V, $R_{G(on)}$ = 4.5 Ω, $R_{G(off)}$ = 4.5 Ω	T_{vj} = 25 °C, I_C = 25 A		86		ns
			T_{vj} = 175 °C, I_C = 25 A		165		
Turn-on energy	E_{on}	V_{CC} = 800 V, V_{GE}=15 V, $R_{G(on)}$ = 4.5 Ω, $R_{G(off)}$ = 4.5 Ω	T_{vj} = 25 °C, I_C = 25 A		0.2		mJ
			T_{vj} = 175 °C, I_C = 25 A		0.3		

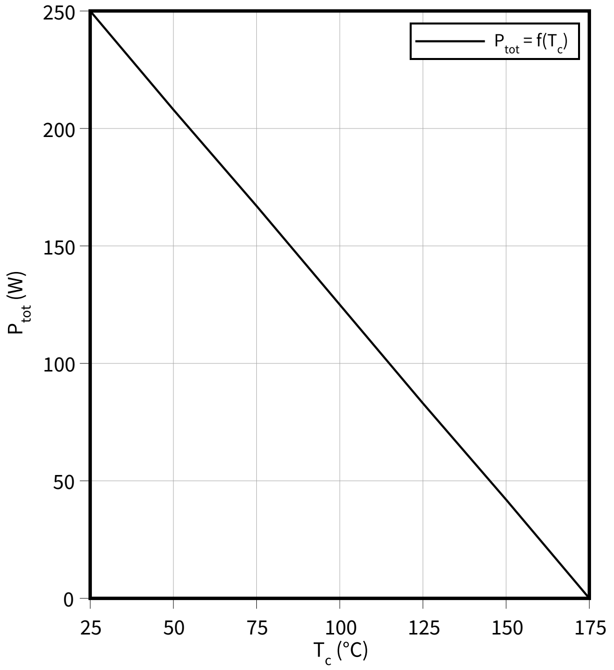
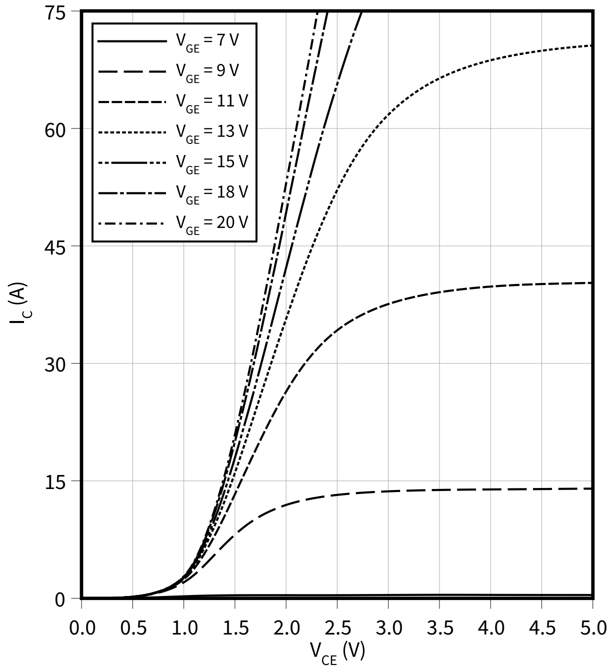
(table continues...)

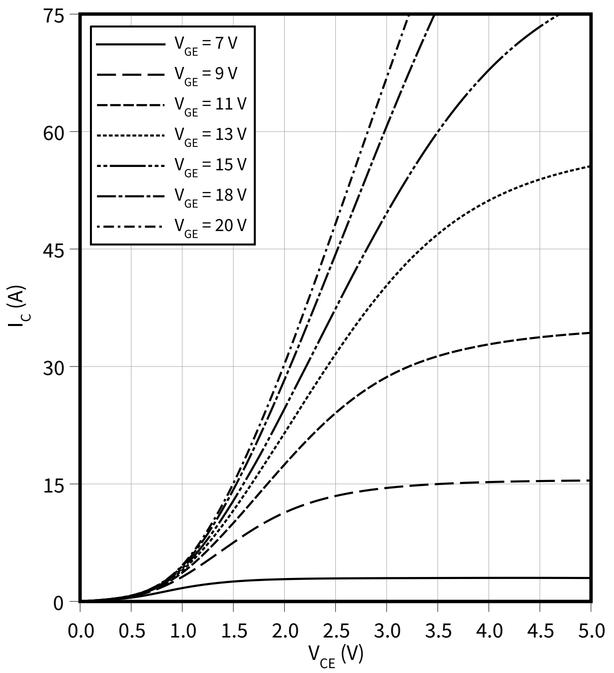
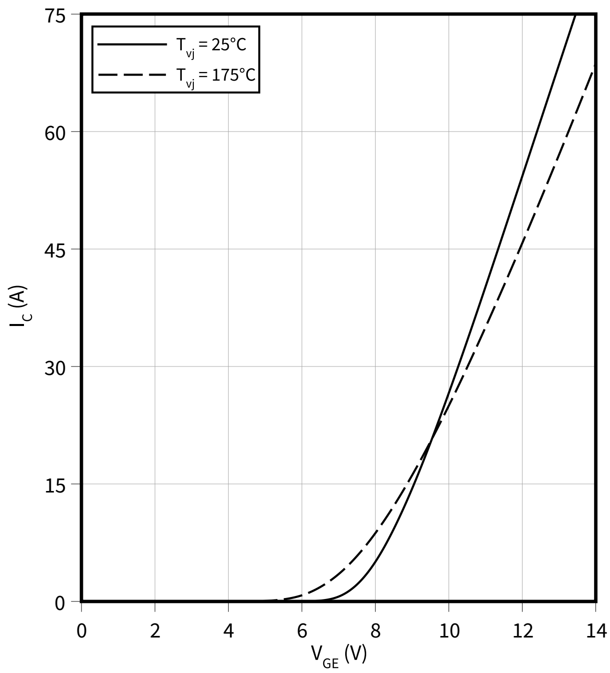
Table 3 **(continued) Characteristic values**

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Turn-off energy	E_{off}	V_{CC} = 800 V, V_{GE}=15 V, $R_{G(on)}$ = 4.5 Ω, $R_{G(off)}$ = 4.5 Ω	T_{vj} = 25 °C, I_C = 25 A		1.47		mJ
			T_{vj} = 175 °C, I_C = 25 A		2.61		
Total switching energy	E_{ts}	V_{CC} = 800 V, V_{GE}=15 V, $R_{G(on)}$ = 4.5 Ω, $R_{G(off)}$ = 4.5 Ω	T_{vj} = 25 °C, I_C = 25 A		1.67		mJ
			T_{vj} = 175 °C, I_C = 25 A		2.91		
Operating junction temperature	T_{vj}			-40		175	°C

***Note**:* *Electrical Characteristic at T_{vj} = 25°C, unless otherwise specified.*

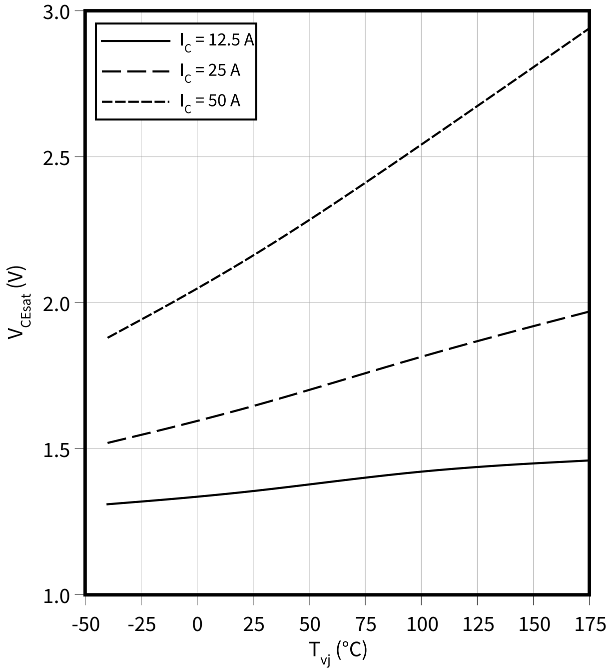
3 Characteristics diagrams

Power dissipation as a function of case temperature $P_{tot} = f(T_c)$ $T_{vj} \leq 175$ °C	**Typical output characteristic** $I_C = f(V_{CE})$ $T_{vj} = 25$ °C
	

Typical output characteristic $I_C = f(V_{CE})$ $T_{vj} = 175$ °C	**Typical transfer characteristic** $I_C = f(V_{GE})$ $V_{CE} = 20$ V
	

Typical collector-emitter saturation voltage as a function of junction temperature

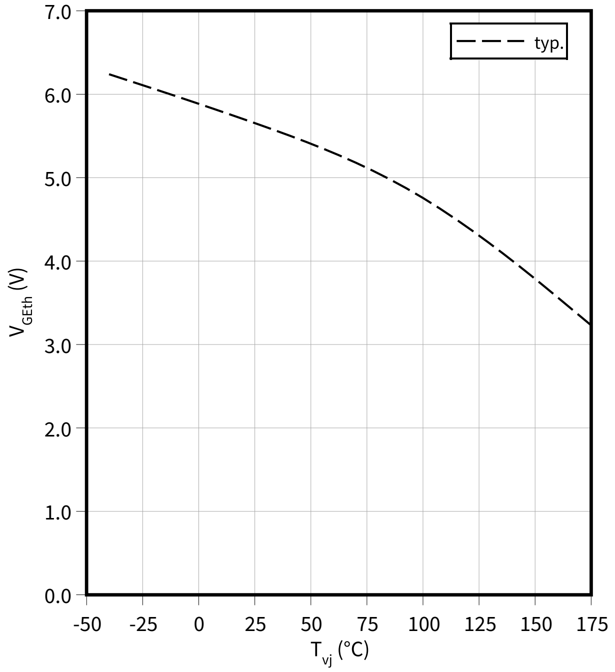
$V_{CEsat} = f(T_{vj})$



Gate-emitter threshold voltage as a function of junction temperature

$V_{GEth} = f(T_{vj})$

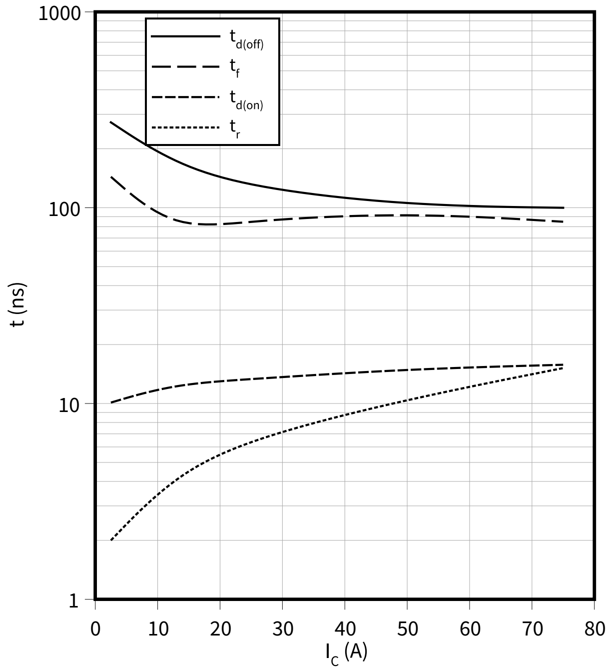
$I_C = 0.85$ mA



Typical switching times as a function of collector current

$t = f(I_C)$

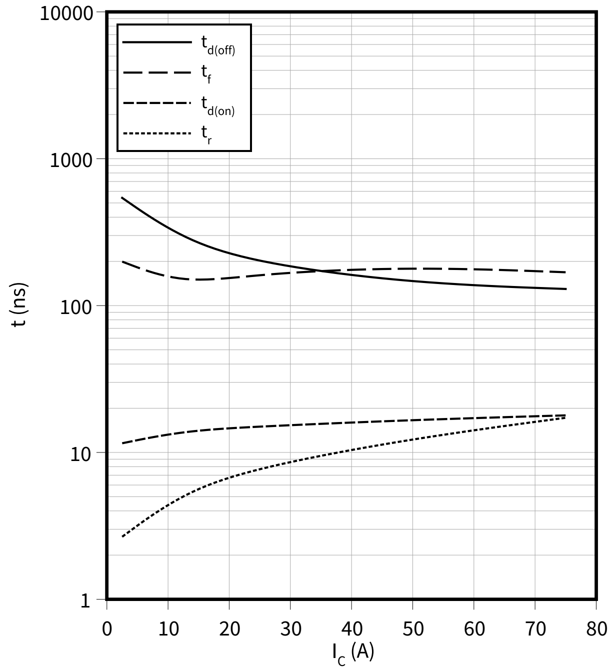
$V_{CC} = 800$ V, $T_{vj} = 25$ °C, $R_G = 4.5\ \Omega$



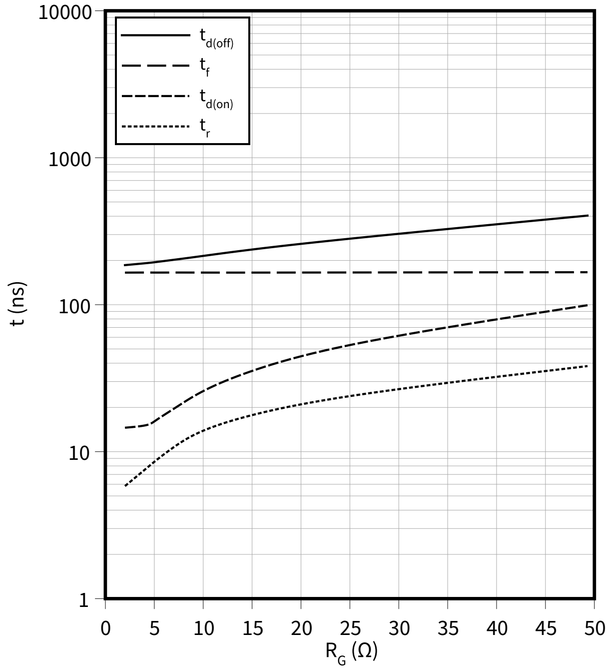
Typical switching times as a function of collector current

$t = f(I_C)$

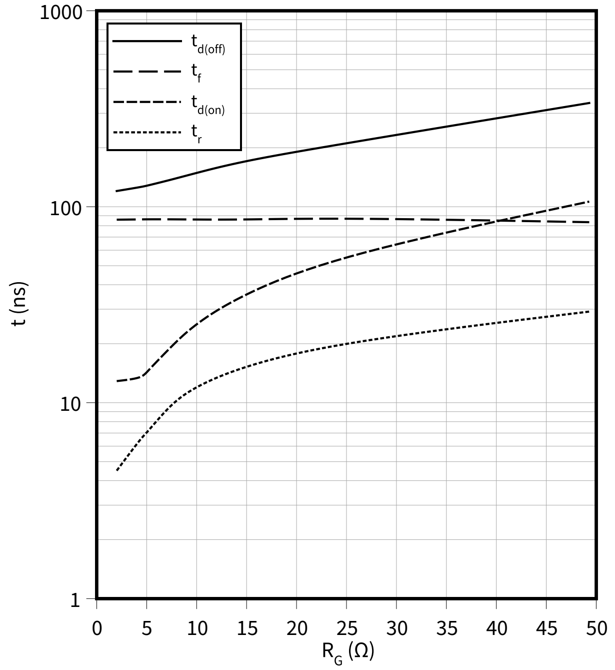
$V_{CC} = 800$ V, $T_{vj} \geq 25$ °C, $R_G = 4.5\ \Omega$



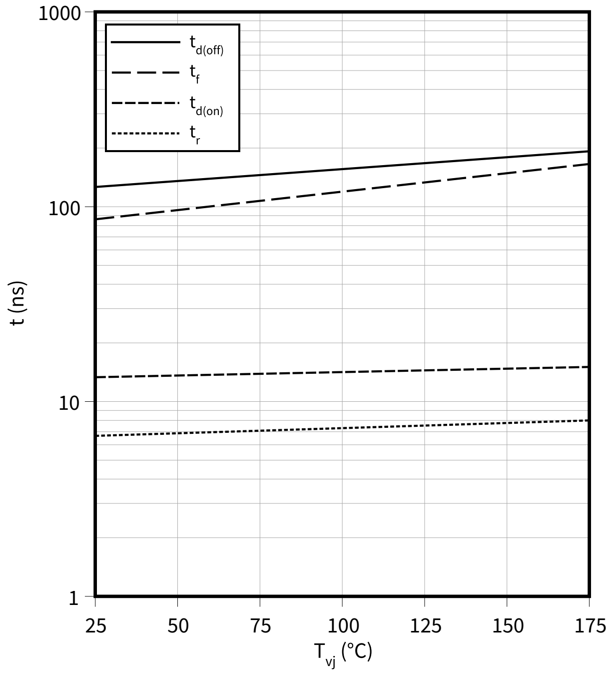
Typical switching times as a function of gate resistor
$t = f(R_G)$
$I_C = 25$ A, $V_{CC} = 800$ V, $T_{vj} = 175$ °C



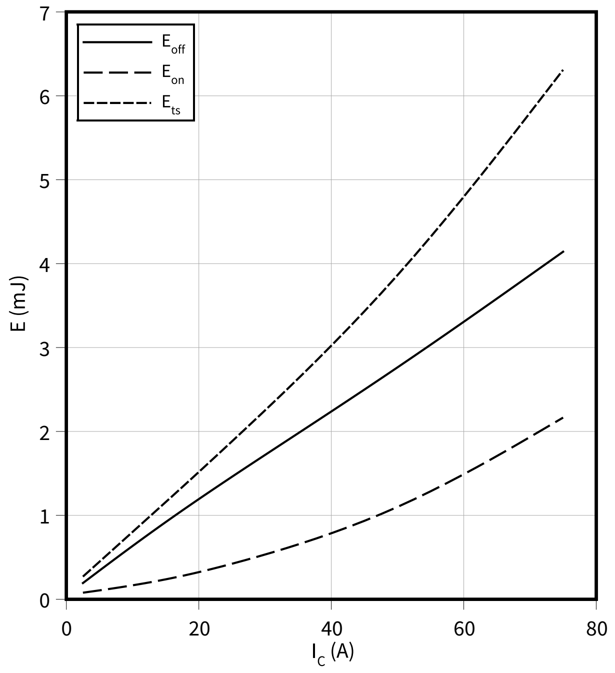
Typical switching times as a function of gate resistor
$t = f(R_G)$
$I_C = 25$ A, $V_{CC} = 800$ V, $T_{vj} = 25$ °C



Typical switching times as a function of junction temperature
$t = f(T_{vj})$
$I_C = 25$ A, $V_{CC} = 800$ V, $R_G = 4.5$ Ω



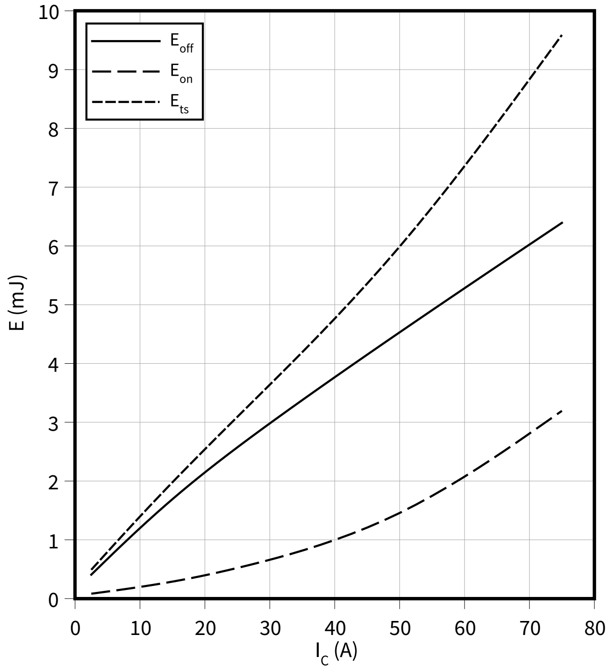
Typical switching energy losses as a function of collector current
$E = f(I_C)$
$V_{CC} = 800$ V, $T_{vj} = 25$ °C, $R_G = 4.5$ Ω



Typical switching energy losses as a function of collector current

$E = f(I_C)$

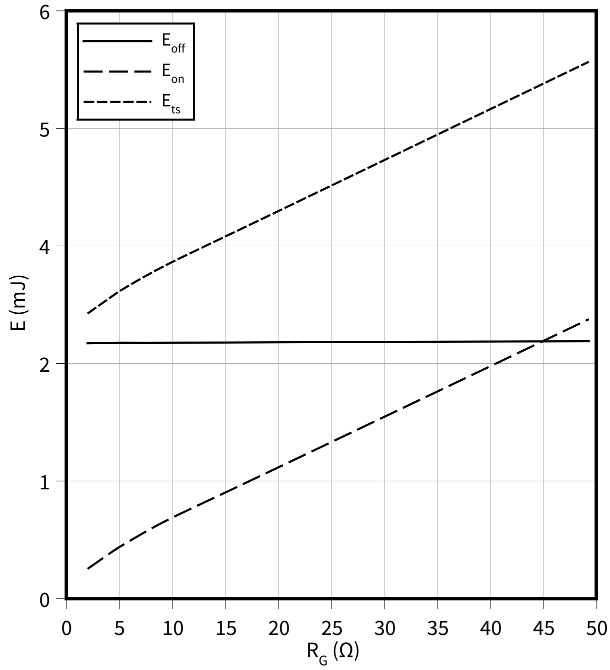
$V_{CC} = 800$ V, $T_{vj} \geq 25$ °C, $R_G = 4.5\ \Omega$



Typical switching energy losses as a function of gate resistor

$E = f(R_G)$

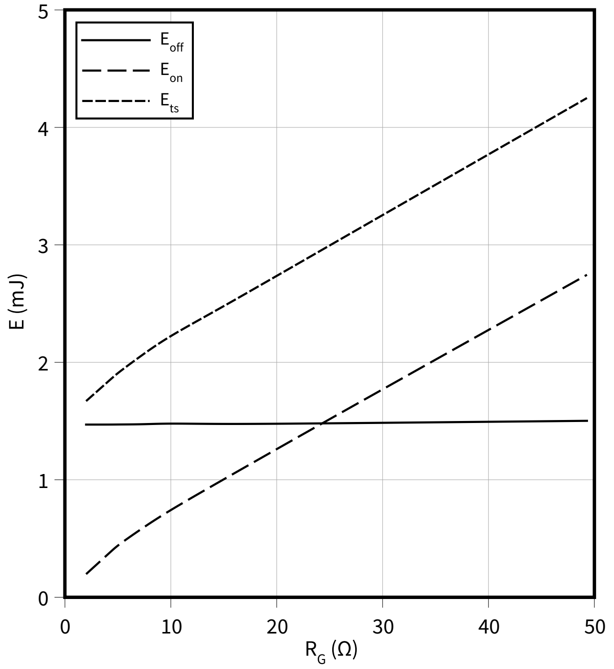
$I_C = 25$ A, $V_{CC} = 800$ V, $T_{vj} = 175$ °C



Typical switching energy losses as a function of gate resistor

$E = f(R_G)$

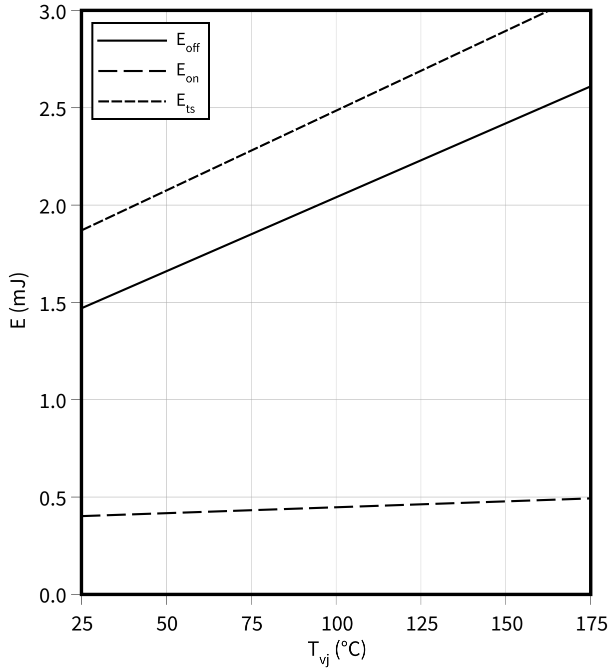
$I_C = 25$ A, $V_{CC} = 800$ V, $T_{vj} = 25$ °C



Typical switching energy losses as a function of junction temperature

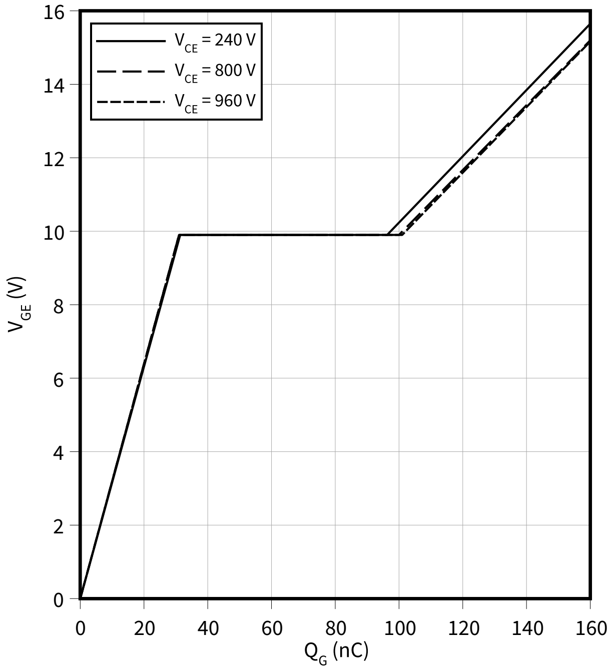
$E = f(T_{vj})$

$I_C = 25$ A, $V_{CC} = 800$ V, $R_G = 4.5\ \Omega$



Typical gate charge

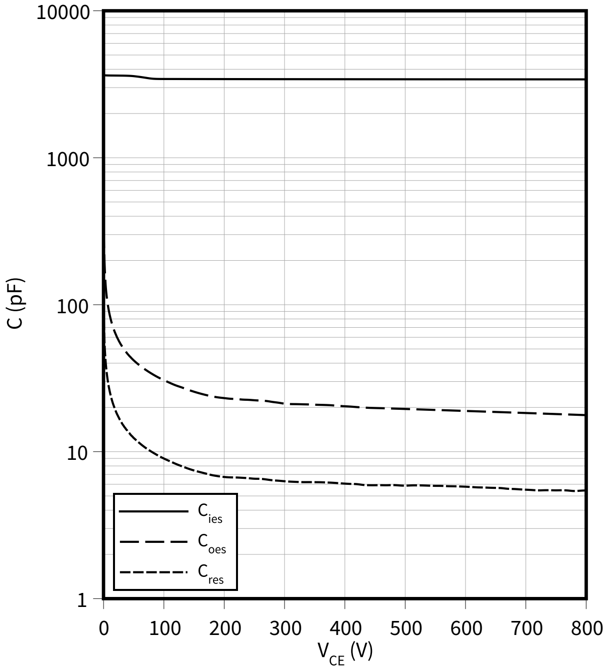
$V_{GE} = f(Q_G)$



Typical capacitance as a function of collector-emitter voltage

$C = f(V_{CE})$

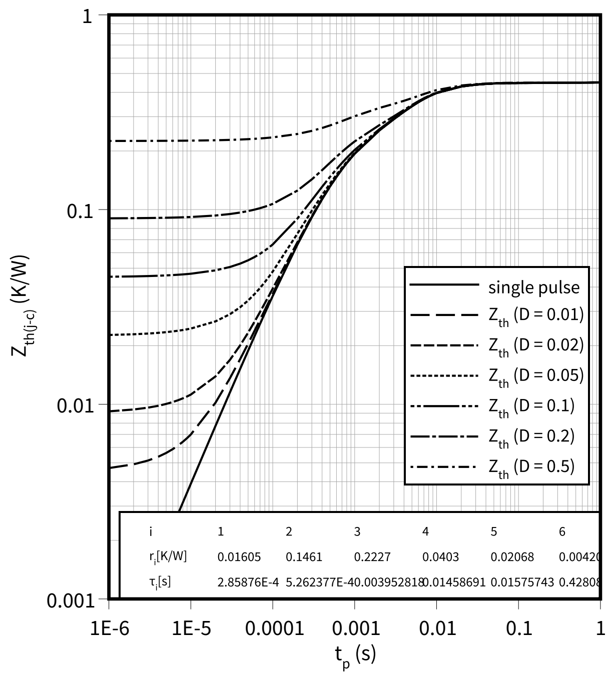
$f = 100$ kHz, $V_{GE} = 0$ V



IGBT typical transient thermal impedance as a function of pulse width

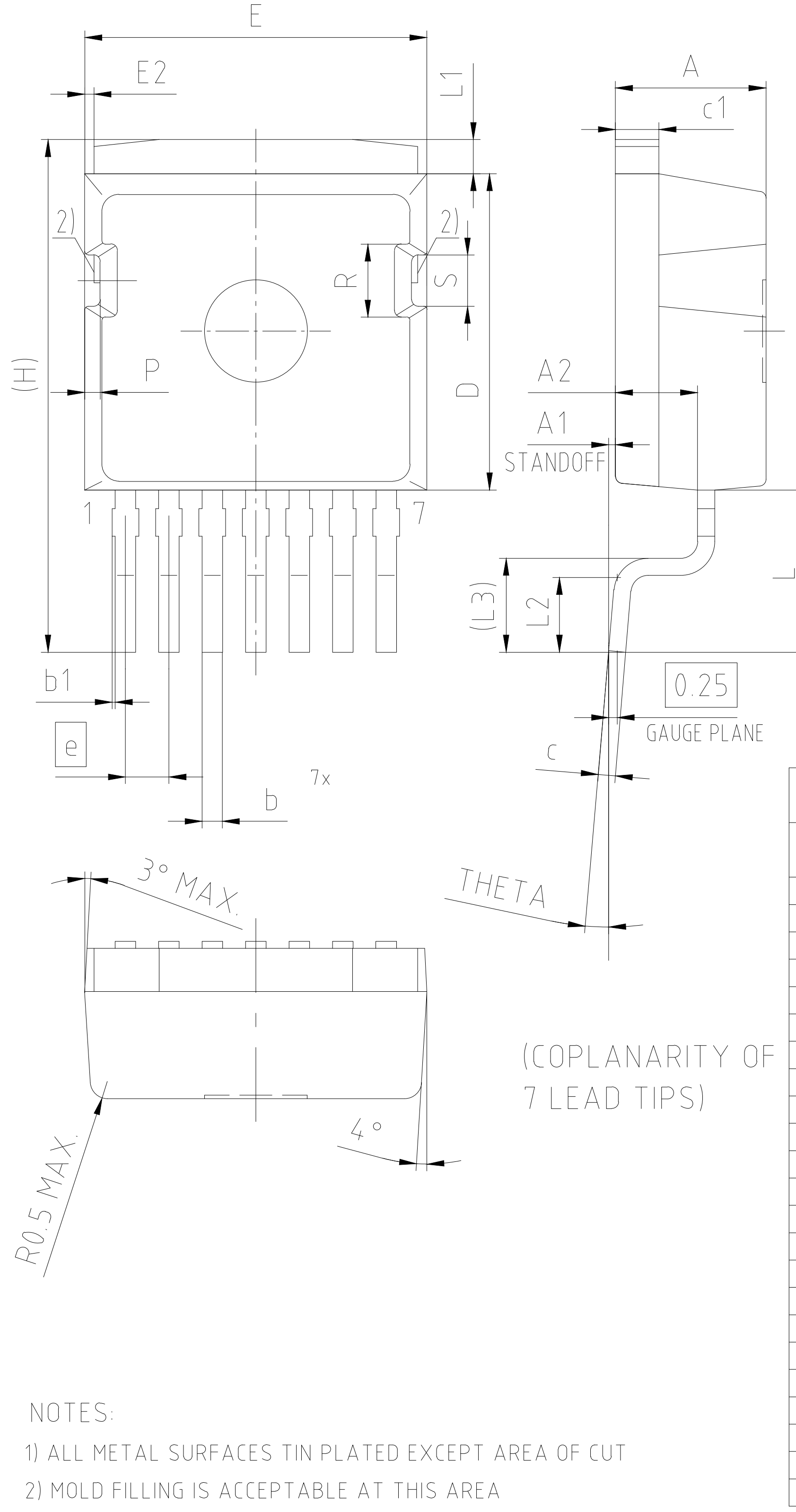
$Z_{th(j\text{-}c)} = f(t_p)$

$D = t_p/T$



i	1	2	3	4	5	6
r_i[K/W]	0.01605	0.1461	0.2227	0.0403	0.02068	0.0042[illegible]
τ_i[s]	2.85876E-4	5.262377E-4	0.003952818	0.01458691	0.01575743	0.42808[illegible]

4 Package outlines



PACKAGE - GROUP NUMBER:	PG-TO263-7-U01	
DIMENSIONS	MILLIMETERS	
	MIN.	MAX.
A	4.30	4.50
A1	0.00	0.10
A2	2.30	2.50
b	0.50	0.70
b1	0.00	0.15
c	0.40	0.60
c1	1.17	1.37
D	9.05	9.45
D1	5.90	6.10
E	9.80	10.20
E1	9.36	9.56
E2	0.00	0.30
E3	8.40	8.60
e	1.27	
H	15.00	
L	4.20	5.20
L1	0.70	1.30
L2	1.70	2.30
L3	2.70	
P	0.35	0.55
R	2.03	2.23
S	1.40	1.60
THETA	0.00°	8.00°

Figure 1

5 Testing conditions

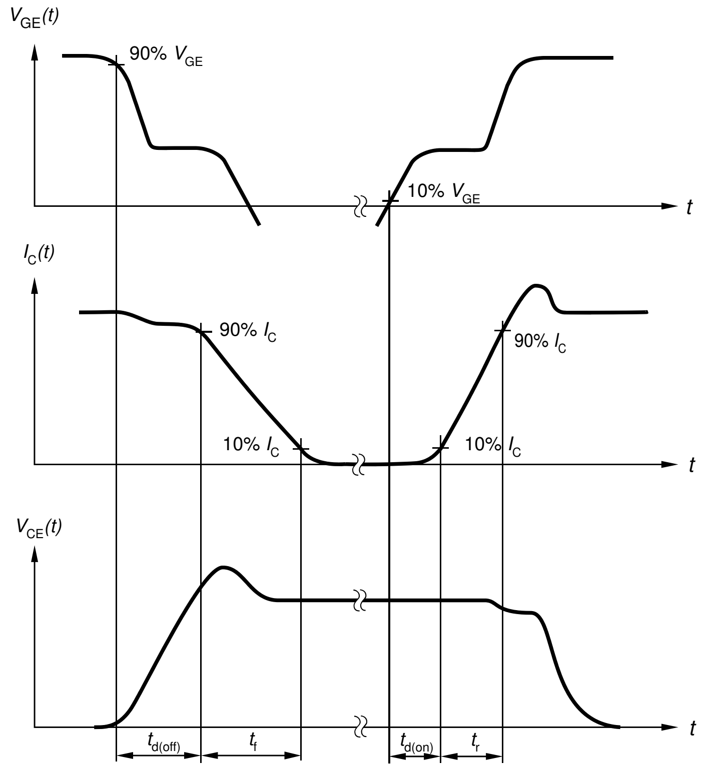


Figure A. **Definition of switching times**

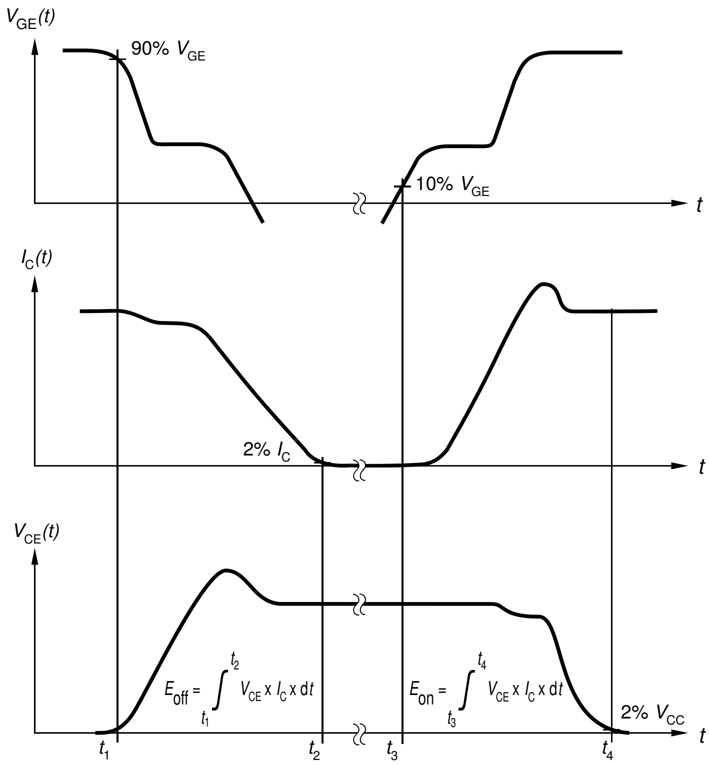


Figure B. **Definition of switching losses**

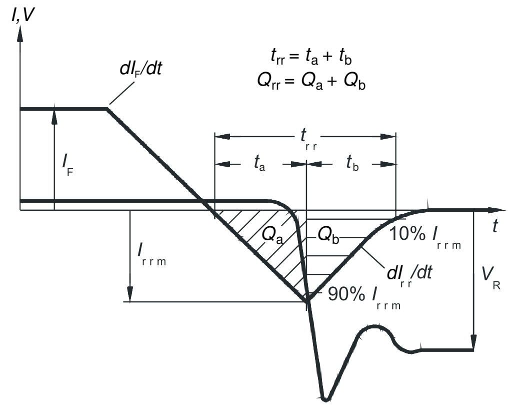


Figure C. **Definition of diode switching characteristics**

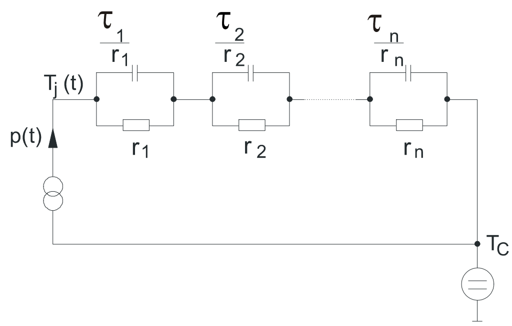


Figure D. **Thermal equivalent circuit**

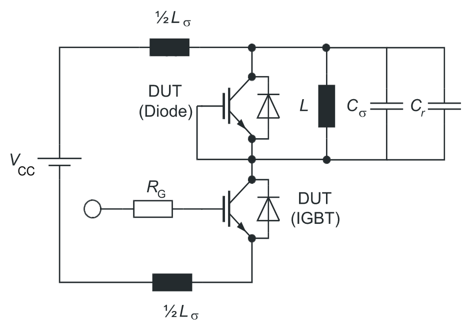


Figure E. **Dynamic test circuit**
Parasitic inductance L_{σ},
parasitic capacitor C_{σ},
relief capacitor C_r,
(only for ZVT switching)

Figure 2

Revision history

Document revision	Date of release	Description of changes
0.10	2024-03-14	Target datasheet
0.20	2025-04-29	Preliminary datasheet
1.00	2025-09-18	Final datasheet

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