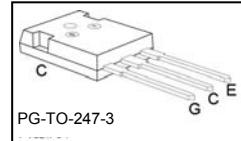
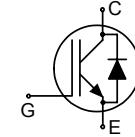


Low Loss DuoPack : IGBT in TrenchStop® and Fieldstop technology with soft, fast recovery anti-parallel EmCon HE diode

- Very low $V_{CE(sat)}$ 1.5 V (typ.)
- Maximum Junction Temperature 175 °C
- Short circuit withstand time – 5μs
- Positive temperature coefficient in $V_{CE(sat)}$
- very tight parameter distribution
- high ruggedness, temperature stable behaviour
- very high switching speed
- Low EMI
- Very soft, fast recovery anti-parallel EmCon HE diode
- Qualified according to JEDEC¹⁾ for target applications
- Pb-free lead plating; RoHS compliant
- Complete product spectrum and PSpice Models : <http://www.infineon.com/igbt/>



Applications:

- Frequency Converters
- Uninterrupted Power Supply

Type	V_{CE}	I_c	$V_{CE(sat), T_j=25^\circ C}$	$T_{j,max}$	Marking	Package
IKW75N60T	600V	75A	1.5V	175°C	K75T60	PG-T0-247-3

Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CE}	600	V
DC collector current, limited by $T_{j,max}$	I_c	80 ²⁾	A
$T_C = 25^\circ C$		75	
$T_C = 100^\circ C$			
Pulsed collector current, t_p limited by $T_{j,max}$	I_{Cpuls}	225	
Turn off safe operating area ($V_{CE} \leq 600V$, $T_j \leq 175^\circ C$)	-	225	
Diode forward current, limited by $T_{j,max}$	I_F	80 ²⁾	
$T_C = 25^\circ C$		75	
$T_C = 100^\circ C$			
Diode pulsed current, t_p limited by $T_{j,max}$	I_{Fpuls}	225	
Gate-emitter voltage	V_{GE}	±20	V
Short circuit withstand time ³⁾	t_{SC}	5	μs
$V_{GE} = 15V$, $V_{CC} \leq 400V$, $T_j \leq 150^\circ C$			
Power dissipation $T_C = 25^\circ C$	P_{tot}	428	W
Operating junction temperature	T_j	-40...+175	°C
Storage temperature	T_{stg}	-55...+175	
Soldering temperature, 1.6mm (0.063 in.) from case for 10s	-	260	

¹⁾ J-STD-020 and JESD-022

²⁾ Value limited by bondwire

³⁾ Allowed number of short circuits: <1000; time between short circuits: >1s.

Thermal Resistance

Parameter	Symbol	Conditions	Max. Value	Unit
Characteristic				
IGBT thermal resistance, junction – case	R_{thJC}		0.35	K/W
Diode thermal resistance, junction – case	R_{thJCD}		0.6	
Thermal resistance, junction – ambient	R_{thJA}		40	

Electrical Characteristic, at $T_j = 25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			min.	Typ.	max.	
Static Characteristic						
Collector-emitter breakdown voltage	$V_{(BR)CES}$	$V_{GE}=0\text{V}, I_C=0.2\text{mA}$	600	-	-	V
Collector-emitter saturation voltage	$V_{CE(\text{sat})}$	$V_{GE} = 15\text{V}, I_C=75\text{A}$ $T_j=25^\circ\text{C}$ $T_j=175^\circ\text{C}$	-	1.5	2.0	
Diode forward voltage	V_F	$V_{GE}=0\text{V}, I_F=75\text{A}$ $T_j=25^\circ\text{C}$ $T_j=175^\circ\text{C}$	-	1.65	2.0	
Gate-emitter threshold voltage	$V_{GE(\text{th})}$	$I_C=1.2\text{mA}, V_{CE}=V_{GE}$	4.1	4.9	5.7	
Zero gate voltage collector current	I_{CES}	$V_{CE}=600\text{V}, V_{GE}=0\text{V}$ $T_j=25^\circ\text{C}$ $T_j=175^\circ\text{C}$	-	-	40	μA
-			-	-	1000	
Gate-emitter leakage current	I_{GES}	$V_{CE}=0\text{V}, V_{GE}=20\text{V}$	-	-	100	nA
Transconductance	g_{fs}	$V_{CE}=20\text{V}, I_C=75\text{A}$	-	41	-	S
Integrated gate resistor	R_{Gint}			-		Ω

Dynamic Characteristic

Input capacitance	C_{iss}	$V_{CE}=25\text{V},$	-	4620	-	pF
Output capacitance	C_{oss}	$V_{GE}=0\text{V},$	-	288	-	
Reverse transfer capacitance	C_{rss}	$f=1\text{MHz}$	-	137	-	
Gate charge	Q_{Gate}	$V_{CC}=480\text{V}, I_C=75\text{A}$ $V_{GE}=15\text{V}$	-	470	-	nC
Internal emitter inductance measured 5mm (0.197 in.) from case	L_E		-	13	-	nH
Short circuit collector current ¹⁾	$I_{C(SC)}$	$V_{GE}=15\text{V}, t_{SC}\leq 5\mu\text{s}$ $V_{CC} = 400\text{V},$ $T_j \leq 150^\circ\text{C}$	-	690	-	A

¹⁾ Allowed number of short circuits: <1000; time between short circuits: >1s.

Switching Characteristic, Inductive Load, at $T_j=25^\circ\text{C}$

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
IGBT Characteristic						
Turn-on delay time	$t_{d(on)}$	$T_j=25^\circ\text{C}$, $V_{CC}=400\text{V}$, $I_C=75\text{A}$, $V_{GE}=0/15\text{V}$, $R_G=5\Omega$, $L_\sigma^{(1)}=100\text{nH}$, $C_\sigma^{(1)}=39\text{pF}$ Energy losses include “tail” and diode reverse recovery.	-	33	-	ns
Rise time	t_r		-	36	-	
Turn-off delay time	$t_{d(off)}$		-	330	-	
Fall time	t_f		-	35	-	
Turn-on energy	E_{on}		-	2.0	-	mJ
Turn-off energy	E_{off}		-	2.5	-	
Total switching energy	E_{ts}		-	4.5	-	

Anti-Parallel Diode Characteristic

Diode reverse recovery time	t_{rr}	$T_j=25^\circ\text{C}$, $V_R=400\text{V}$, $I_F=75\text{A}$, $di_F/dt=1460\text{A}/\mu\text{s}$	-	121	-	ns
Diode reverse recovery charge	Q_{rr}		-	2.4	-	μC
Diode peak reverse recovery current	I_{rrm}		-	38.5	-	A
Diode peak rate of fall of reverse recovery current during t_b	di_{rr}/dt		-	921	-	$\text{A}/\mu\text{s}$

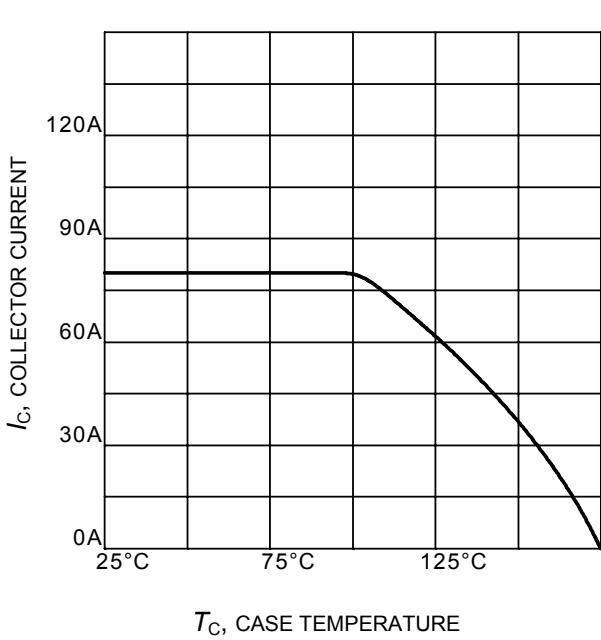
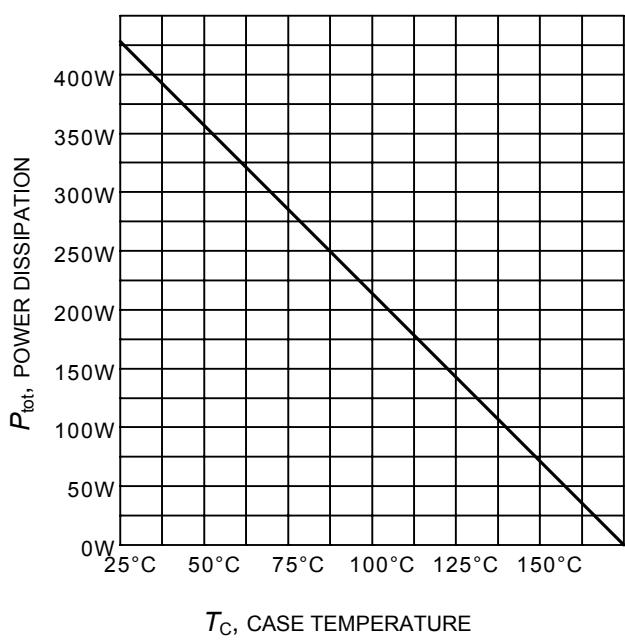
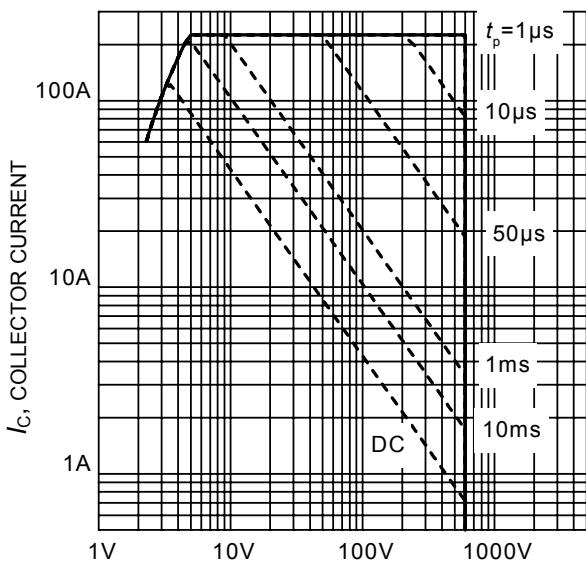
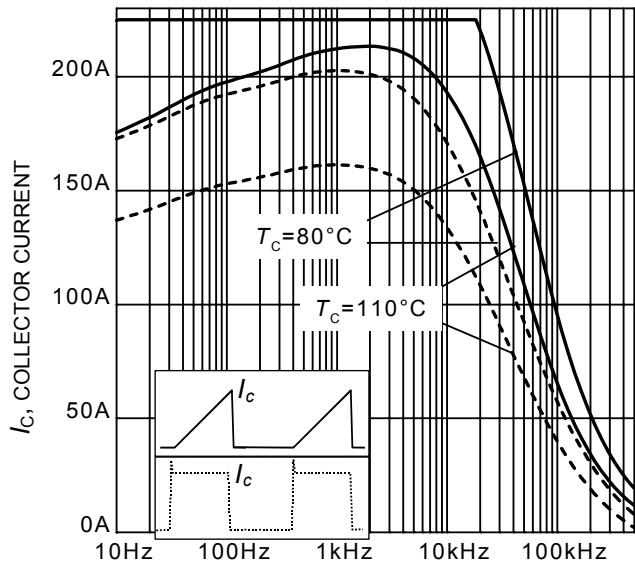
Switching Characteristic, Inductive Load, at $T_j=175^\circ\text{C}$

Parameter	Symbol	Conditions	Value			Unit
			min.	typ.	max.	
IGBT Characteristic						
Turn-on delay time	$t_{d(on)}$	$T_j=175^\circ\text{C}$, $V_{CC}=400\text{V}$, $I_C=75\text{A}$, $V_{GE}=0/15\text{V}$, $R_G=5\Omega$, $L_\sigma^{(1)}=100\text{nH}$, $C_\sigma^{(1)}=39\text{pF}$ Energy losses include “tail” and diode reverse recovery.	-	32	-	ns
Rise time	t_r		-	37	-	
Turn-off delay time	$t_{d(off)}$		-	363	-	
Fall time	t_f		-	38	-	
Turn-on energy	E_{on}		-	2.9	-	mJ
Turn-off energy	E_{off}		-	2.9	-	
Total switching energy	E_{ts}		-	5.8	-	

Anti-Parallel Diode Characteristic

Diode reverse recovery time	t_{rr}	$T_j=175^\circ\text{C}$, $V_R=400\text{V}$, $I_F=75\text{A}$, $di_F/dt=1460\text{A}/\mu\text{s}$	-	182	-	ns
Diode reverse recovery charge	Q_{rr}		-	5.8	-	μC
Diode peak reverse recovery current	I_{rrm}		-	56.2	-	A
Diode peak rate of fall of reverse recovery current during t_b	di_{rr}/dt		-	1013	-	$\text{A}/\mu\text{s}$

¹⁾ Leakage inductance L_σ and Stray capacity C_σ due to dynamic test circuit in Figure E.



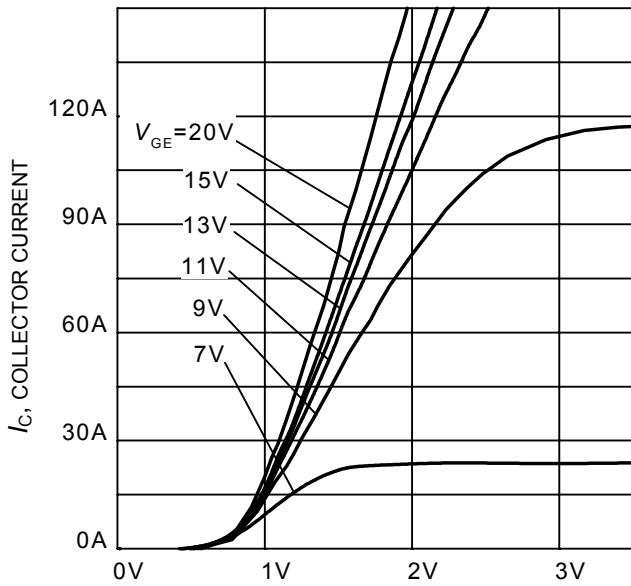

 V_{CE} , COLLECTOR-EMITTER VOLTAGE

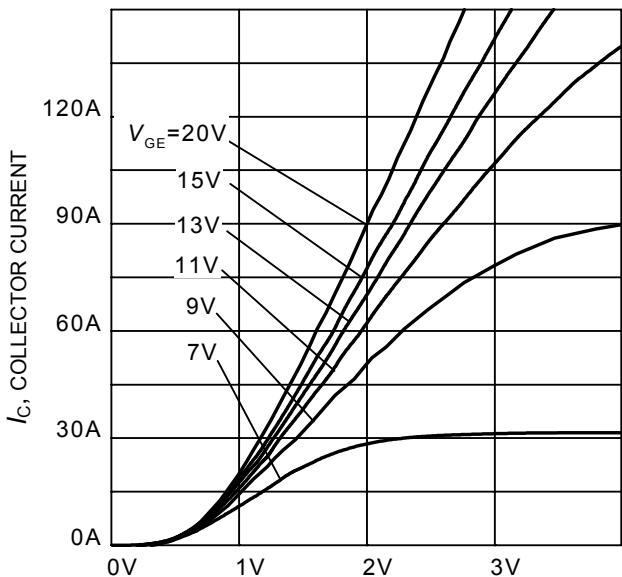
Figure 5. Typical output characteristic
 $(T_j = 25^\circ\text{C})$

 V_{CE} , COLLECTOR-EMITTER VOLTAGE

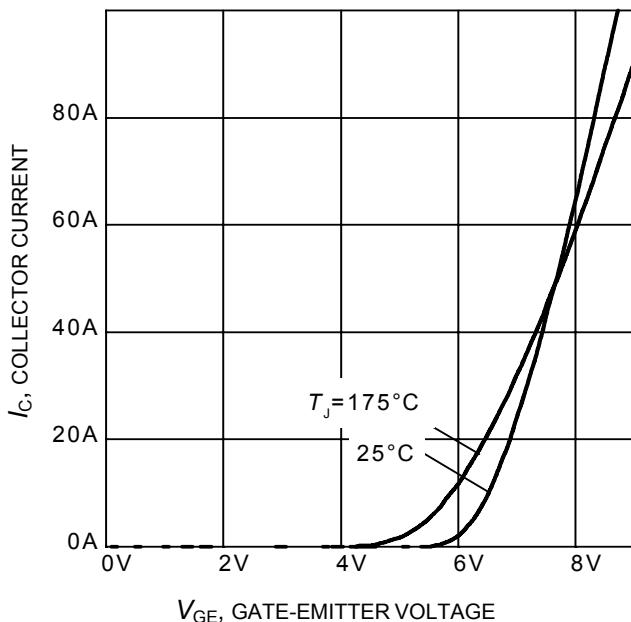
Figure 6. Typical output characteristic
 $(T_j = 175^\circ\text{C})$

 V_{GE} , GATE-EMITTER VOLTAGE

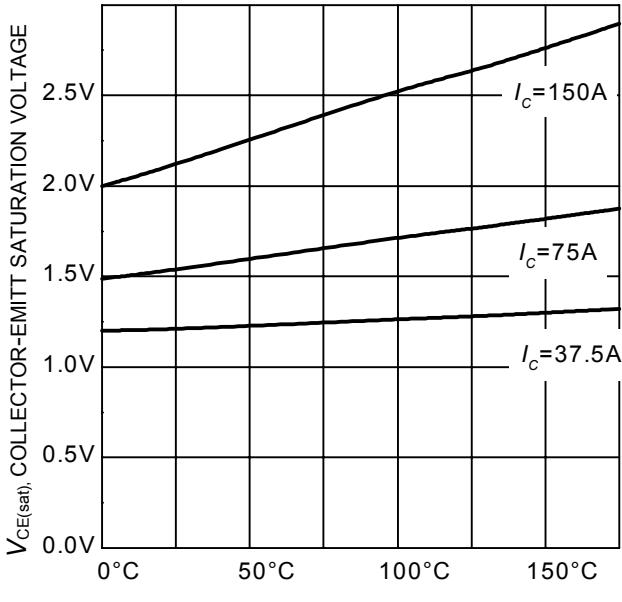
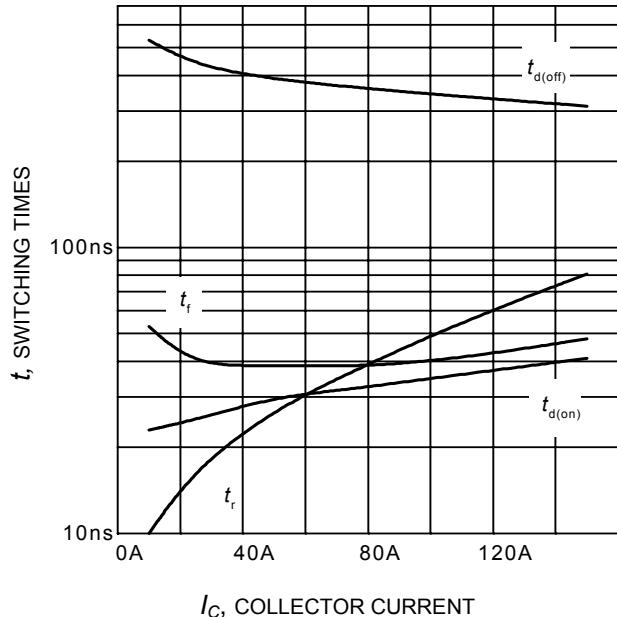
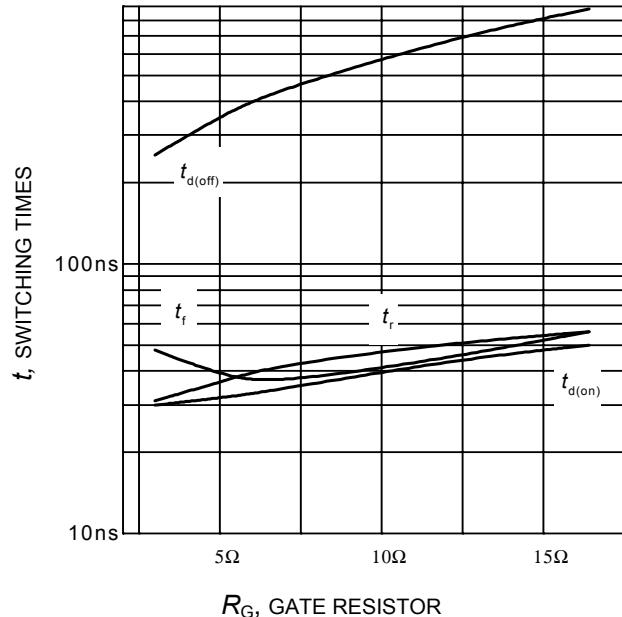
Figure 7. Typical transfer characteristic
 $(V_{CE}=20\text{V})$

 T_j , JUNCTION TEMPERATURE

Figure 8. Typical collector-emitter saturation voltage as a function of junction temperature
 $(V_{GE} = 15\text{V})$



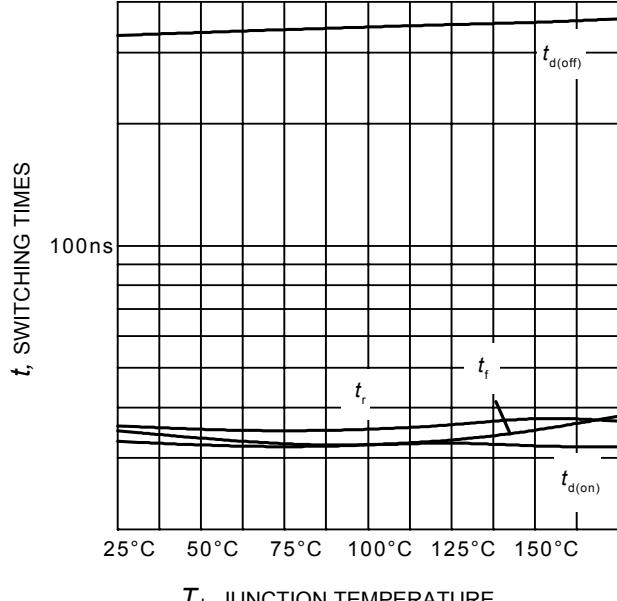
I_C , COLLECTOR CURRENT

Figure 9. Typical switching times as a function of collector current
(inductive load, $T_J=175^\circ\text{C}$,
 $V_{CE} = 400\text{V}$, $V_{GE} = 0/15\text{V}$, $R_G = 5\Omega$,
Dynamic test circuit in Figure E)



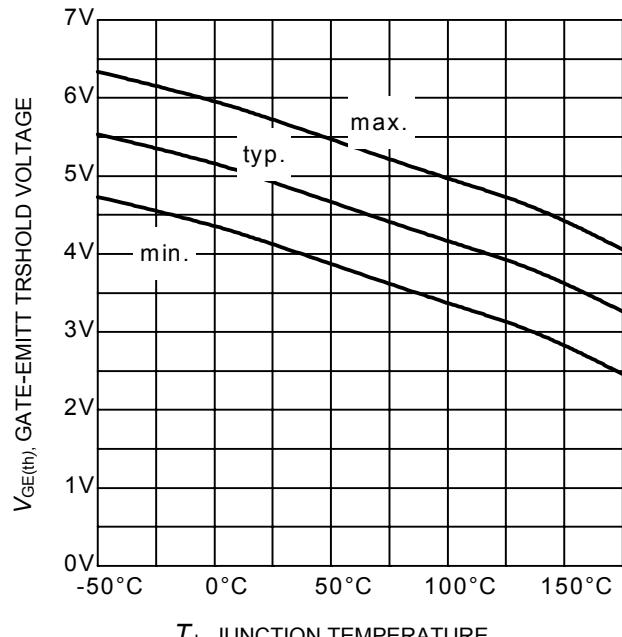
R_G , GATE RESISTOR

Figure 10. Typical switching times as a function of gate resistor
(inductive load, $T_J = 175^\circ\text{C}$,
 $V_{CE} = 400\text{V}$, $V_{GE} = 0/15\text{V}$, $I_C = 75\text{A}$,
Dynamic test circuit in Figure E)



T_J , JUNCTION TEMPERATURE

Figure 11. Typical switching times as a function of junction temperature
(inductive load, $V_{CE} = 400\text{V}$,
 $V_{GE} = 0/15\text{V}$, $I_C = 10\text{A}$, $R_G = 5\Omega$,
Dynamic test circuit in Figure E)



T_J , JUNCTION TEMPERATURE

Figure 12. Gate-emitter threshold voltage as a function of junction temperature
($I_C = 1.2\text{mA}$)

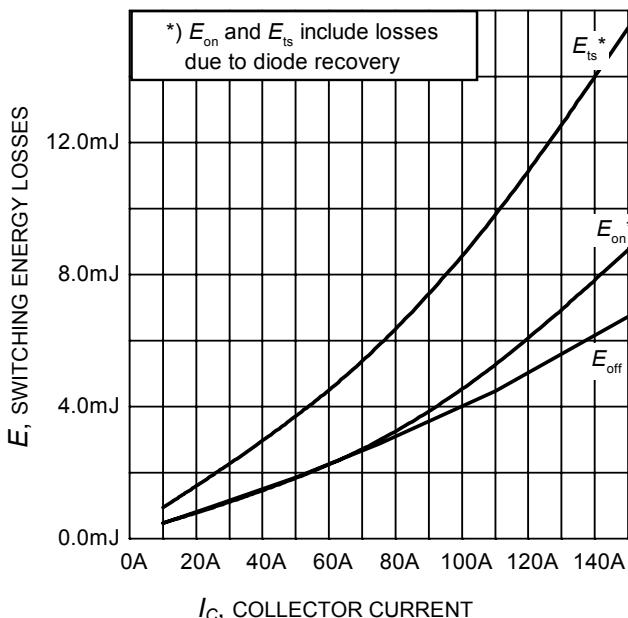


Figure 13. Typical switching energy losses as a function of collector current
 (inductive load, $T_J = 175^\circ\text{C}$,
 $V_{CE} = 400\text{V}$, $V_{GE} = 0/15\text{V}$, $R_G = 5\Omega$,
 Dynamic test circuit in Figure E)

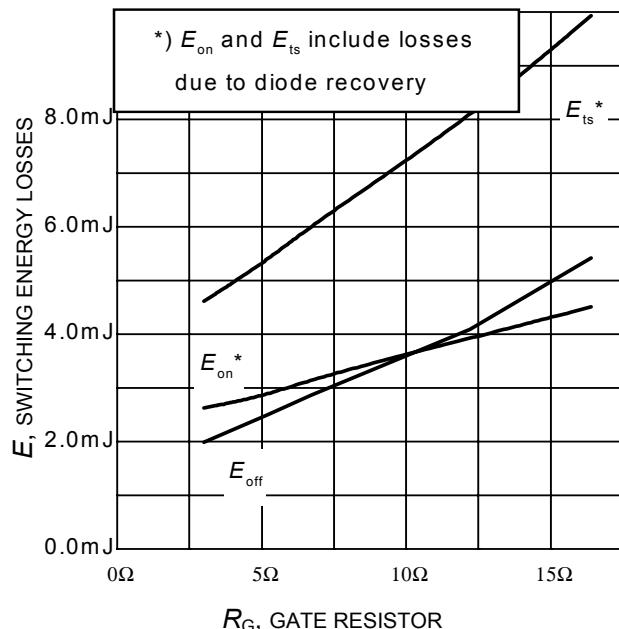


Figure 14. Typical switching energy losses as a function of gate resistor
 (inductive load, $T_J = 175^\circ\text{C}$,
 $V_{CE} = 400\text{V}$, $V_{GE} = 0/15\text{V}$, $I_C = 75\text{A}$,
 Dynamic test circuit in Figure E)

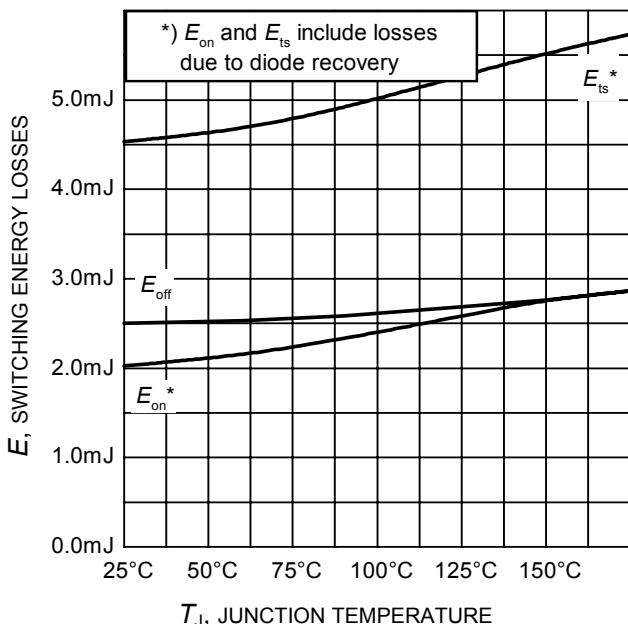


Figure 15. Typical switching energy losses as a function of junction temperature
 (inductive load, $V_{CE} = 400\text{V}$,
 $V_{GE} = 0/15\text{V}$, $I_C = 75\text{A}$, $R_G = 5\Omega$,
 Dynamic test circuit in Figure E)

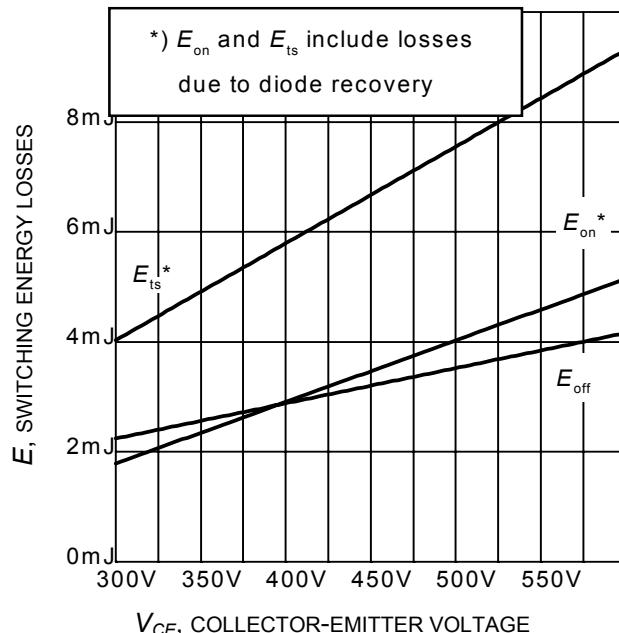
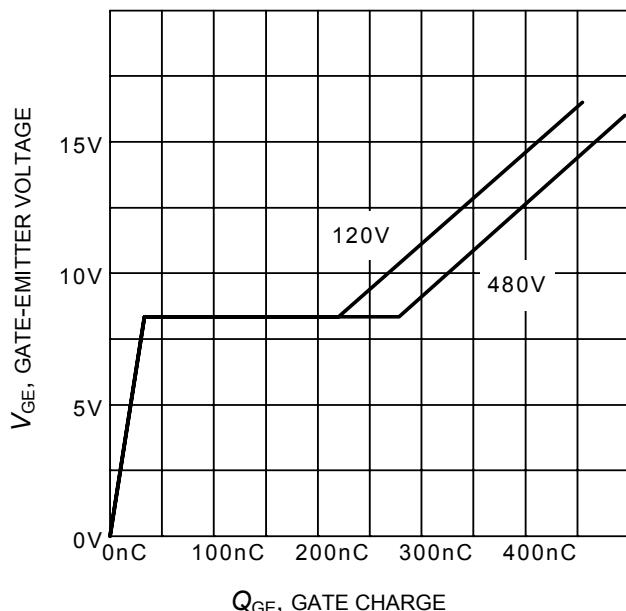
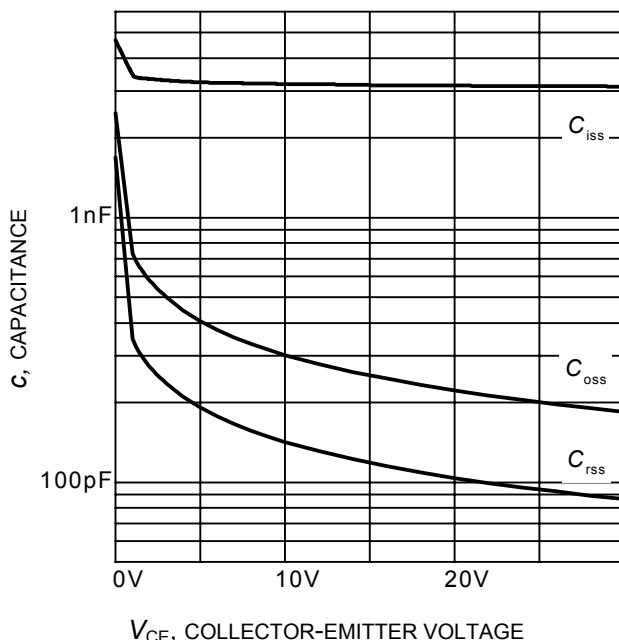


Figure 16. Typical switching energy losses as a function of collector-emitter voltage
 (inductive load, $T_J = 175^\circ\text{C}$,
 $V_{GE} = 0/15\text{V}$, $I_C = 75\text{A}$, $R_G = 5\Omega$,
 Dynamic test circuit in Figure E)



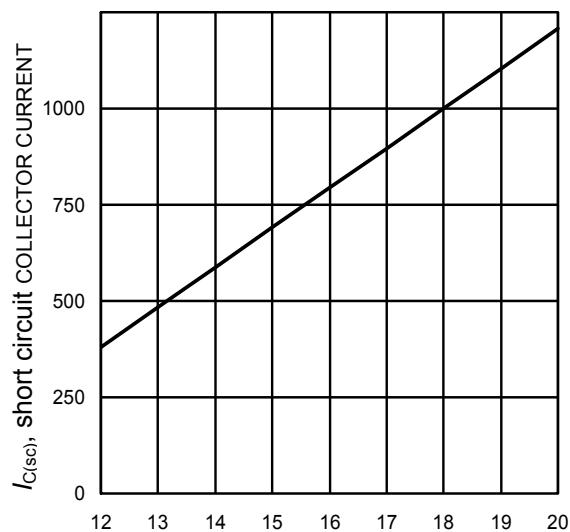
Q_{GE} , GATE CHARGE

Figure 17. Typical gate charge
($I_C=75$ A)



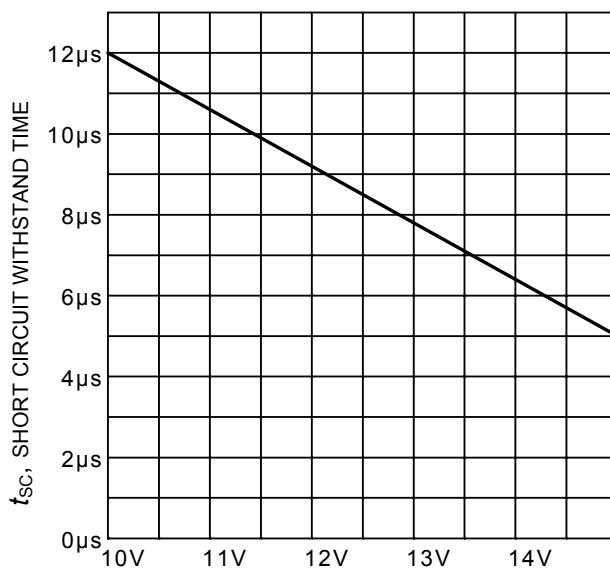
V_{CE} , COLLECTOR-EMITTER VOLTAGE

Figure 18. Typical capacitance as a function of collector-emitter voltage
($V_{GE}=0$ V, $f = 1$ MHz)



V_{GE} , GATE-EMITTER VOLTAGE

Figure 19. Typical short circuit collector current as a function of gate-emitter voltage
($V_{CE} \leq 400$ V, $T_j \leq 150^\circ\text{C}$)



V_{GE} , GATE-EMITTER VOLTAGE

Figure 20. Short circuit withstand time as a function of gate-emitter voltage
($V_{CE}=400$ V, start at $T_j=25^\circ\text{C}$, $T_{jmax}<150^\circ\text{C}$)

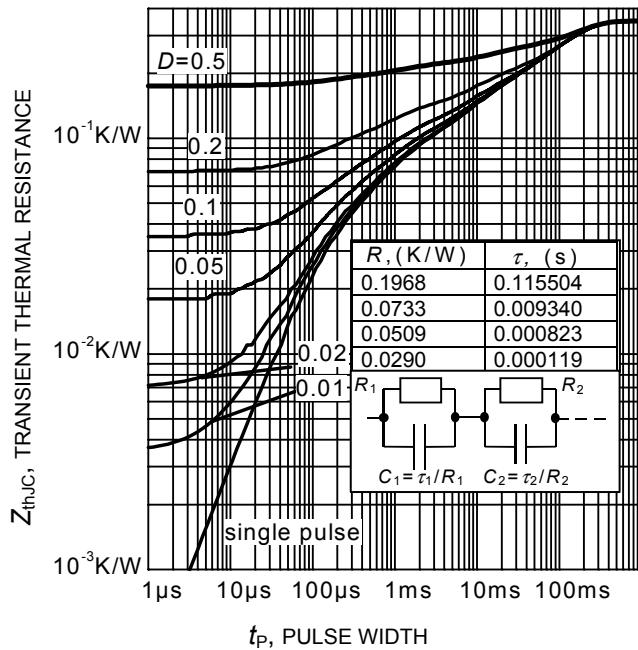


Figure 21. IGBT transient thermal resistance
($D = t_p / T$)

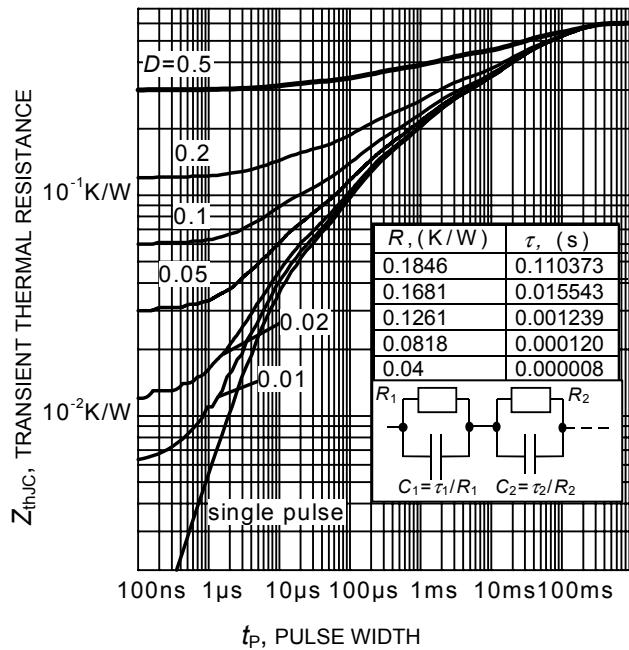


Figure 22. Diode transient thermal impedance as a function of pulse width
($D=t_p/T$)

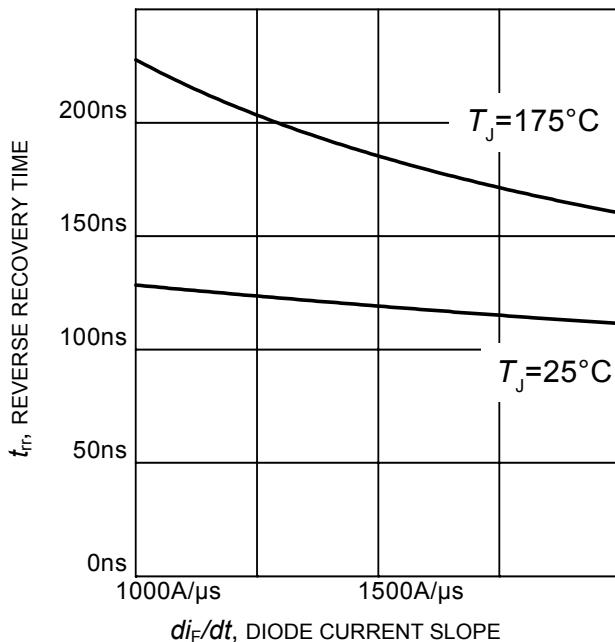


Figure 23. Typical reverse recovery time as a function of diode current slope
($V_R=400\text{V}$, $I_F=75\text{A}$,
Dynamic test circuit in Figure E)

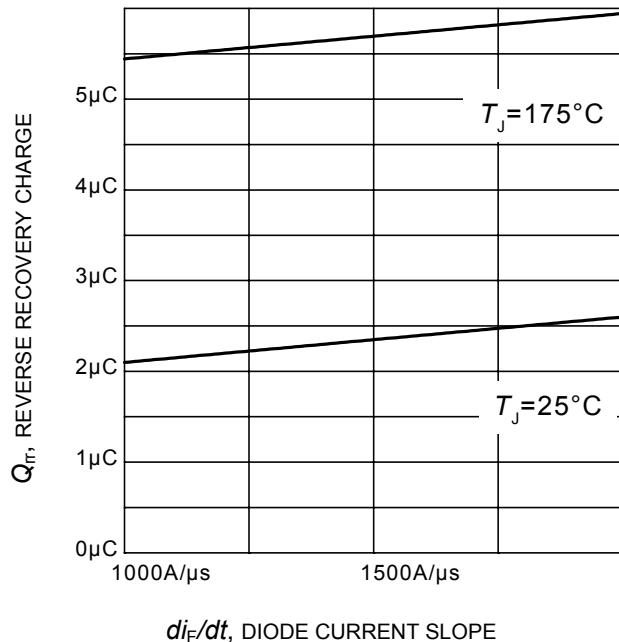
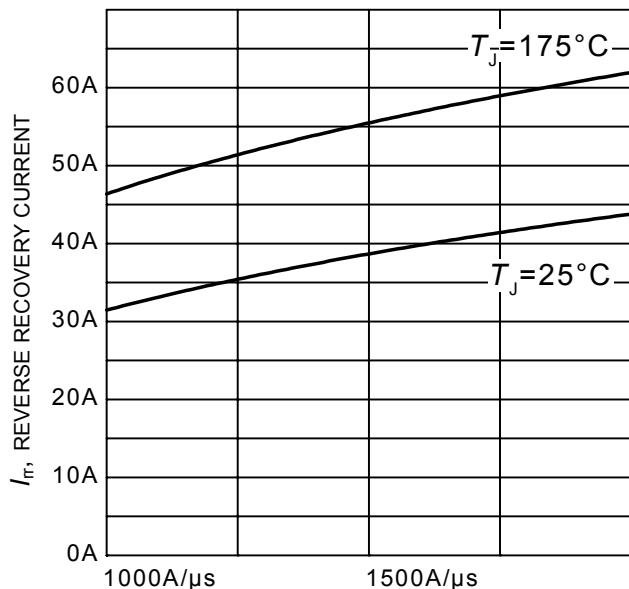


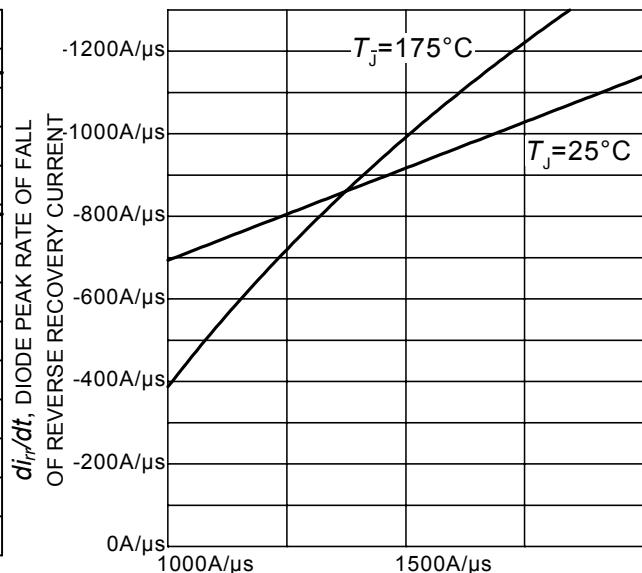
Figure 24. Typical reverse recovery charge as a function of diode current slope
($V_R = 400\text{V}$, $I_F = 75\text{A}$,
Dynamic test circuit in Figure E)



di_F/dt , DIODE CURRENT SLOPE

Figure 25. Typical reverse recovery current as a function of diode current slope

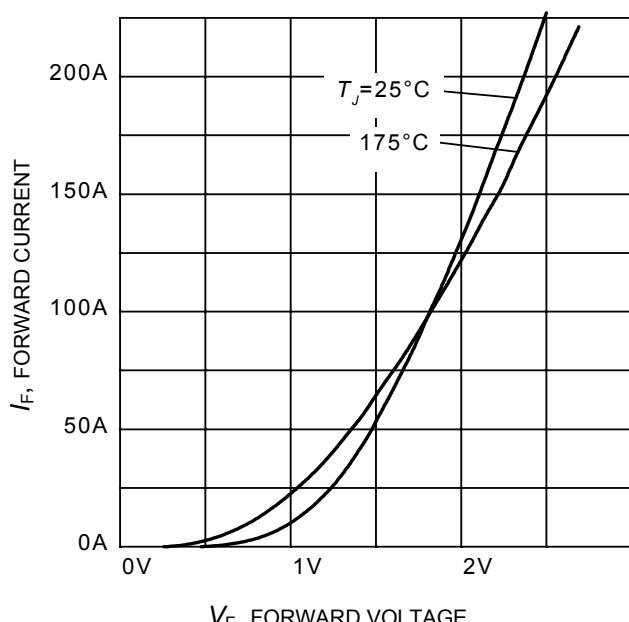
($V_R = 400V$, $I_F = 75A$,
Dynamic test circuit in Figure E)



di_F/dt , DIODE CURRENT SLOPE

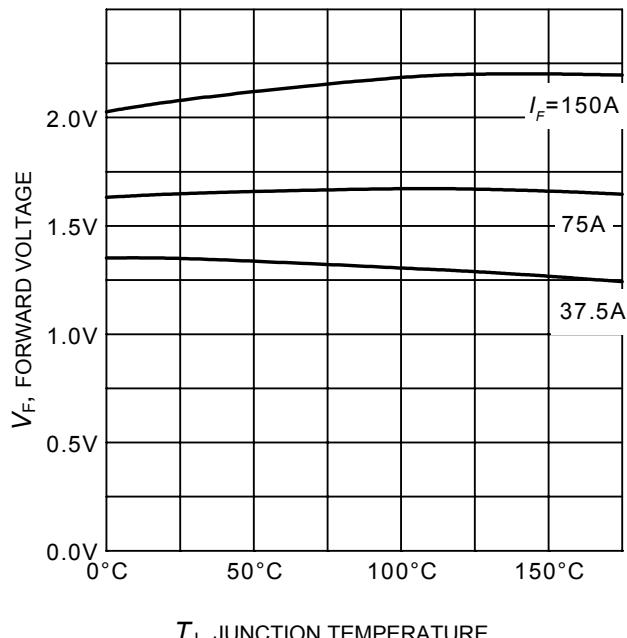
Figure 26. Typical diode peak rate of fall of reverse recovery current as a function of diode current slope

($V_R=400V$, $I_F=75A$,
Dynamic test circuit in Figure E)



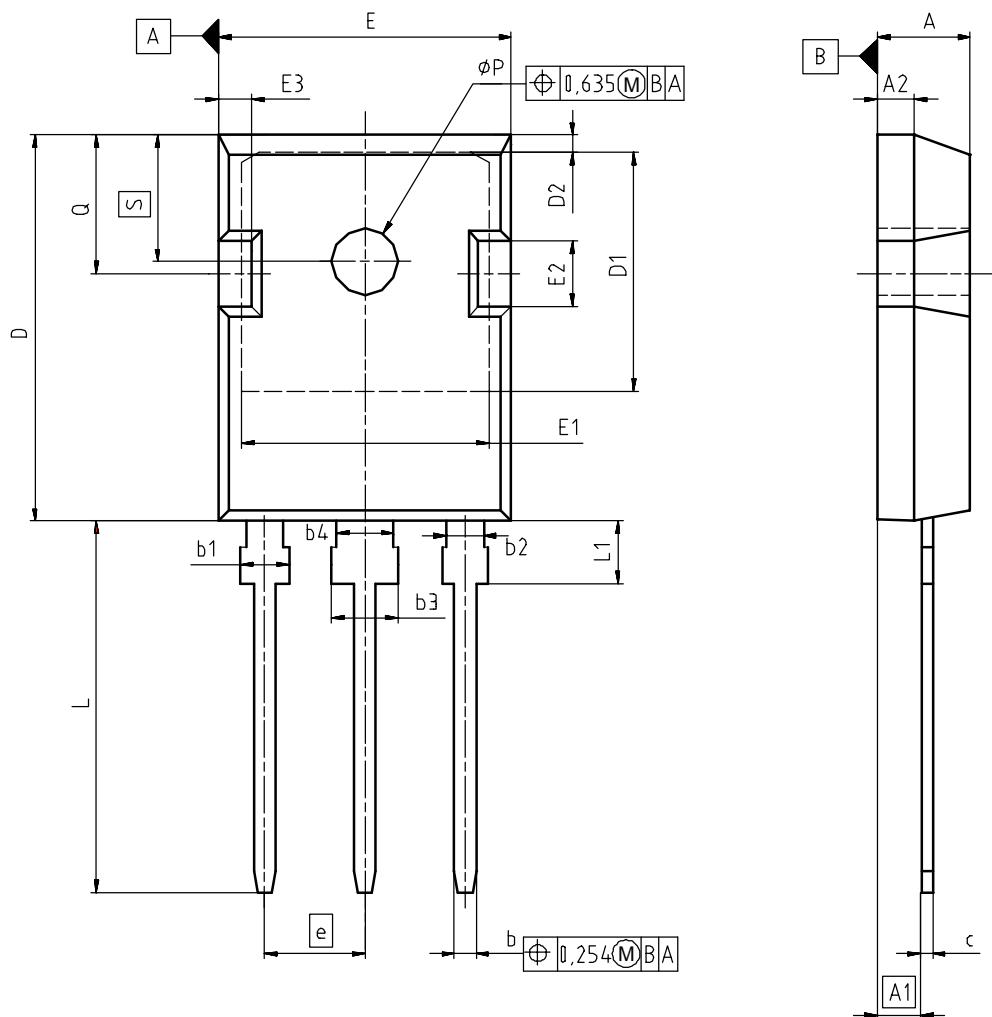
V_F , FORWARD VOLTAGE

Figure 27. Typical diode forward current as a function of forward voltage



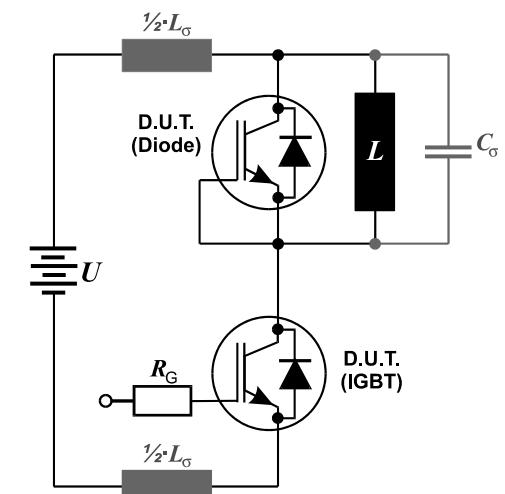
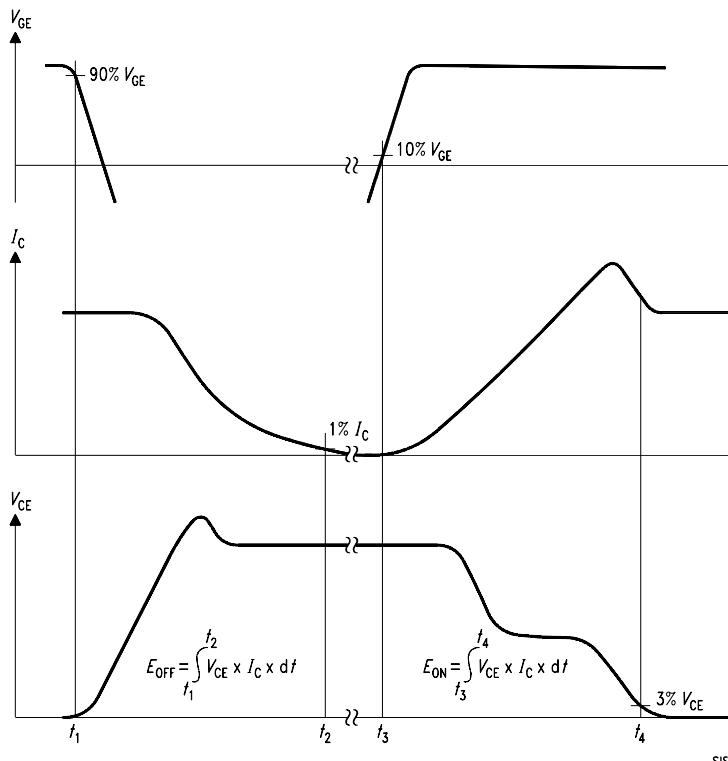
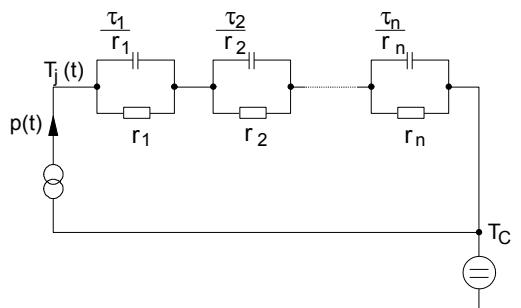
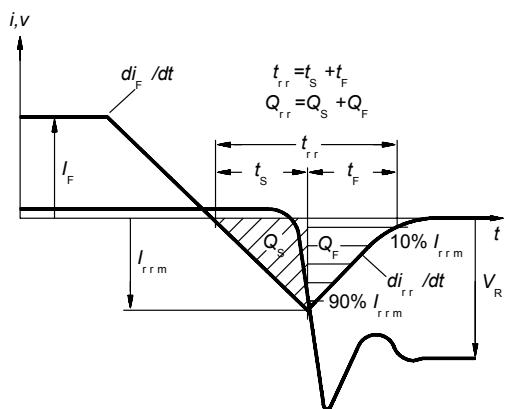
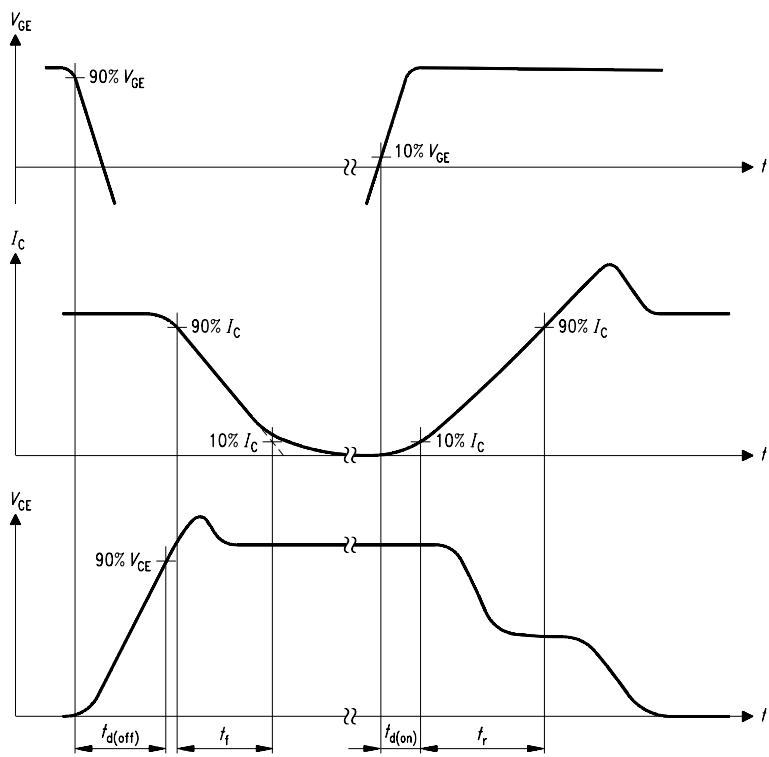
T_J , JUNCTION TEMPERATURE

Figure 28. Typical diode forward voltage as a function of junction temperature

PG-T0247-3


DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.90	5.16	0.193	0.203
A1	2.27	2.53	0.089	0.099
A2	1.85	2.11	0.073	0.083
b	1.07	1.33	0.042	0.052
b1	1.90	2.41	0.075	0.095
b2	1.90	2.16	0.075	0.085
b3	2.87	3.38	0.113	0.133
b4	2.87	3.13	0.113	0.123
c	0.55	0.68	0.022	0.027
D	20.82	21.10	0.820	0.831
D1	16.25	17.65	0.640	0.695
D2	1.05	1.35	0.041	0.053
E	15.70	16.03	0.618	0.631
E1	13.10	14.15	0.516	0.557
E2	3.68	5.10	0.145	0.201
E3	1.68	2.60	0.066	0.102
e	5.44		0.214	
N	3		3	
L	19.80	20.31	0.780	0.799
L1	4.17	4.47	0.164	0.176
ϕP	3.50	3.70	0.138	0.146
Q	5.49	6.00	0.216	0.236
S	6.04	6.30	0.238	0.248

DOCUMENT NO.	Z8B00003327
SCALE	0 0 5 5 7.5mm
EUROPEAN PROJECTION	
ISSUE DATE	17-12-2007
REVISION	03



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- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помошь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помошь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



Как с нами связаться

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