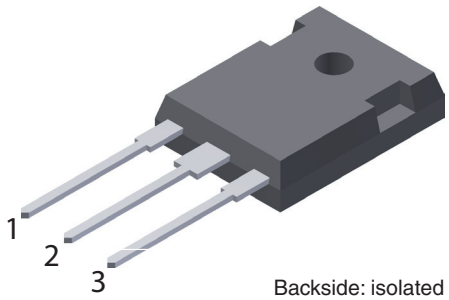
Trench IGBT

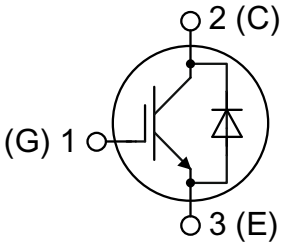
Copack

V_{CES} = 1200 V
I_{C25} = 72 A
$V_{CE(sat)}$ = 2.05 V

Part number
ITF48IF1200HR



Backside: isolated
E72873



Features / Advantages:

- Easy paralleling due to the positive temperature coefficient of the on-state voltage
- Fast Trench IGBT
  - very low $V_{CE(sat)}$
  - short circuit rated for 10 µsec.
  - very low gate charge
  - low EMI
  - square RBSOA @ 3x I_C
- Sonic™ diode
  - fast and soft reverse recovery
  - low operating forward voltage

Applications:

- Solar inverter
- Medical equipment
- Uninerruptible power supply
- Air-conditioning system
- Welding equipment
- Switched-mode and resonant-mode power supplies
- Inductive heating, cookers
- Pumps, Fans

Package: ISO247

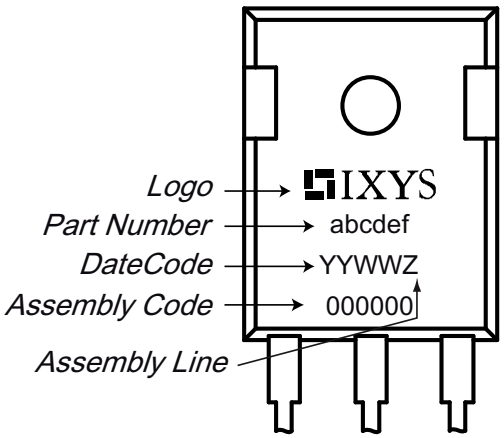
- Isolation Voltage: 3600 V~
- Industry standard outline
- RoHS compliant
- Epoxy meets UL 94V-0
- Soldering pins for PCB mounting
- Backside: DCB ceramic
- Reduced weight
- Advanced power cycling

IGBT				Ratings			
Symbol	Definitions	Conditions		min.	typ.	max.	
V_{CE}	*collector emitter voltage*		T_{VJ} = 25°C			1200	V
V_{GES}	*max. DC gate voltage*		T_{VJ} = 25°C			±20	V
I_{C25}	*collector current*		T_C = 25°C			72	A
I_{C80}			T_C = 80°C			56	A
I_{C100}			T_C = 100°C			48	A
P_{tot}	*total power dissipation*		T_C = 25°C			390	W
$V_{CE(sat)}$	*collector emitter saturation voltage*	I_C = 40 A; V_{GE} = 15 V	T_{VJ} = 25°C		2.05	2.40	V
			T_{VJ} = 175°C		2.70		V
$V_{GE(th)}$	*gate emitter threshold voltage*	I_C = 1.5 mA; V_{GE} = V_{CE}	T_{VJ} = 25°C	5.3	5.8	6.3	V
I_{CES}	*collector emitter leakage current*	V_{CE} = V_{CES}; V_{GE} = 0 V	T_{VJ} = 25°C			0.25	mA
			T_{VJ} = 175°C		1.5		mA
I_{GES}	*gate emitter leakage current*	V_{GE} = ±20 V				600	nA
Q_{Gon}	*total gate charge*	V_{CE} = 600 V; V_{GE} = 0/15 V; I_C = 40 A			175		nC
$t_{d(on)}$	*turn-on delay time*	inductive load V_{CE} = 600 V; I_C = 40 A V_{GE} = 0/15 V; R_G = 12 Ω	T_{VJ} = 150°C		26		ns
t_r	*current rise time*				26		ns
$t_{d(off)}$	*turn-off delay time*				350		ns
t_f	*current fall time*				110		ns
E_{on}	*turn-on energy per pulse*				3.0		mJ
E_{off}	*turn-off energy per pulse*				2.4		mJ
$E_{rec(off)}$	*reverse recovery losses at turn- off*				1.1		mJ
RBSOA	*reverse bias safe operating area*	V_{GE} = 15 V; V_{CEmax} = 1200 V	T_{VJ} ≤ 175°C				
I_{CM}						160	A
SCSOA	*short circuit safe operation area*	V_{CE} = 600 V; V_{GE} = ±15 V R_G = 12 Ω; none repetitive	T_{VJ} ≤ 175°C				
t_{SC}	*short circuit duration*					10	µs
I_{SC}	*short circuit current*				140		A
R_{thJC}	*thermal resistance junction to case*					0.38	K/W
R_{thJH}	*thermal resistance junction to heatsink*	with heat transfer paste (IXYS test setup)			0.6		K/W

Diode							
V_{RRM}	*max. repetitive reverse voltage*		T_C = 25°C			1200	V
I_{F25}	*forward current*		T_C = 25°C			67	A
I_{F80}			T_C = 80°C			50	A
I_{F100}			T_C = 100°C			43	A
V_F	*forward voltage*	I_F = 30 A	T_{VJ} = 25°C			2.20	V
			T_{VJ} = 125°C		1.95		V
Q_{rr}	*reverse recovery charge*	V_R = 600 V $-di_F/dt$ = -1800 A/µs I_F = 40 A; V_{GE} = 0 V	T_{VJ} = 150°C		3.8		µC
I_{RM}	*max. reverse recovery current*				55		A
t_{rr}	*reverse recovery time*				250		ns
E_{rec}	*reverse recovery losses*				1.1		mJ
R_{thJC}	*thermal resistance junction to case*					0.7	K/W
R_{thJH}	*thermal resistance junction to heatsink*	with heat transfer paste (IXYS test setup)			1.1		K/W

Package ISO247			Ratings			
Symbol	**Definitions**	**Conditions**	**min.**	**typ.**	**max.**	
I_{RMS}	*RMS current*	per terminal			50	A
T_{stg}	*storage temperature*		-40		150	°C
T_{op}	*operation temperature*		-40		150	°C
T_{VJ}	*virtual junction temperature*		-40		175	°C
Weight				6		g
M_D	*mounting torque*		0.8		1.2	Nm
F_C	*mounting force with clip*		40		120	N
$d_{Spp/App}$	*creepage distance on surface /*	terminal to terminal	2.7			mm
$d_{Spb/Apb}$	*striking distance through air*	terminal to backside	4.1			mm
V_{ISOL}	*isolation voltage*	t = 1 second t = 1 minute 50/60 Hz; RMS; I_{ISOL} < 1 mA		3600 3000		V V

Product Marking



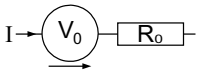
Part number

I = IGBT
T = IGBT Trench
F = Fast
48 = Current Rating [A]
IF = Copack
1200 = Reverse Voltage [V]
HR = ISO247 (3)

Ordering	Part Name	Marking on Product	Delivering Mode	Base Qty	Ordering Code
Standard	ITF48IF1200HR	ITF48IF1200HR	Tube	30	517181

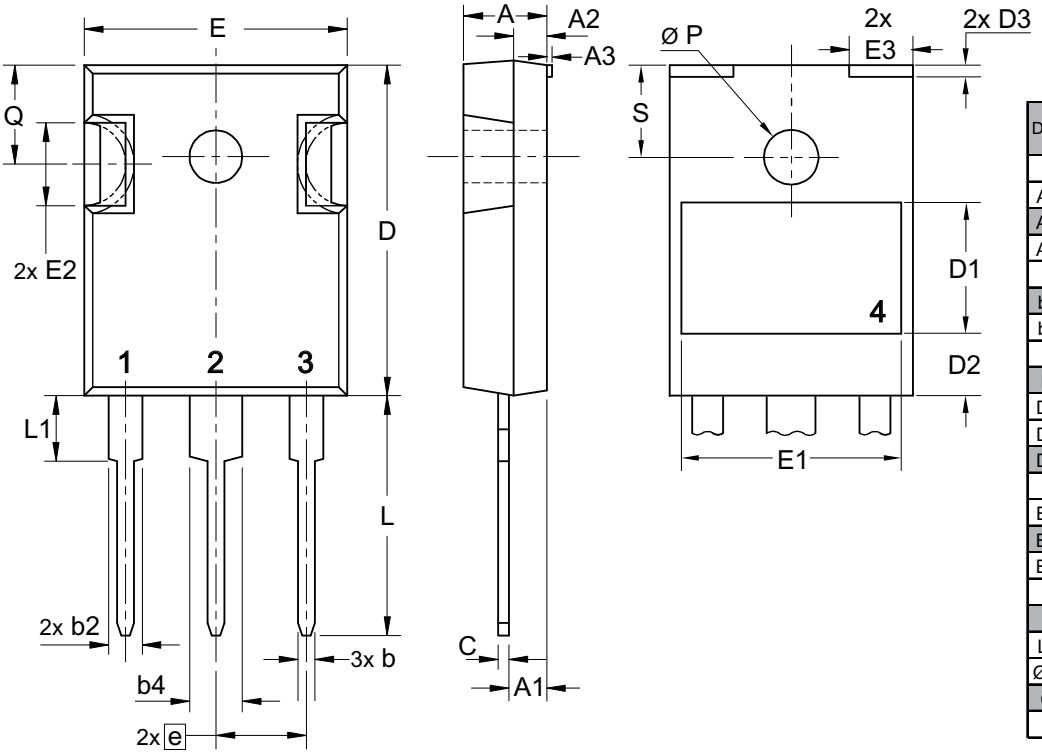
Equivalent Circuits for Simulation

**on die level* T_{VJ} = 175°C

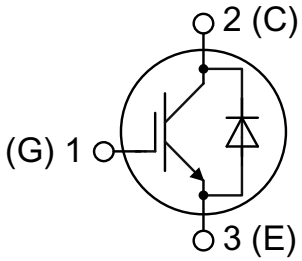


		IGBT	Diode	
$V_{0\ max}$	*threshold voltage*	0.88	1.2	V
$R_{0\ max}$	*slope resistance **	58	30	mΩ

Outlines ISO247



Dim.	Millimeter		Inches	
	min	max	min	max
A	4.70	5.30	0.185	0.209
A1	2.21	2.59	0.087	0.102
A2	1.50	2.49	0.059	0.098
A3	typ. 0.05		typ. 0.002	
b	0.99	1.40	0.039	0.055
b2	1.65	2.39	0.065	0.094
b4	2.59	3.43	0.102	0.135
c	0.38	0.89	0.015	0.035
D	20.79	21.45	0.819	0.844
D1	typ. 8.90		typ. 0.350	
D2	typ. 2.90		typ. 0.114	
D3	typ. 1.00		typ. 0.039	
E	15.49	16.24	0.610	0.639
E1	typ. 13.45		typ. 0.530	
E2	4.31	5.48	0.170	0.216
E3	typ. 4.00		typ. 0.157	
e	5.46 BSC		0.215 BSC	
L	19.80	20.30	0.780	0.799
L1	-	4.49	-	0.177
Ø P	3.55	3.65	0.140	0.144
Q	5.38	6.19	0.212	0.244
S	6.14 BSC		0.242 BSC	



IGBT

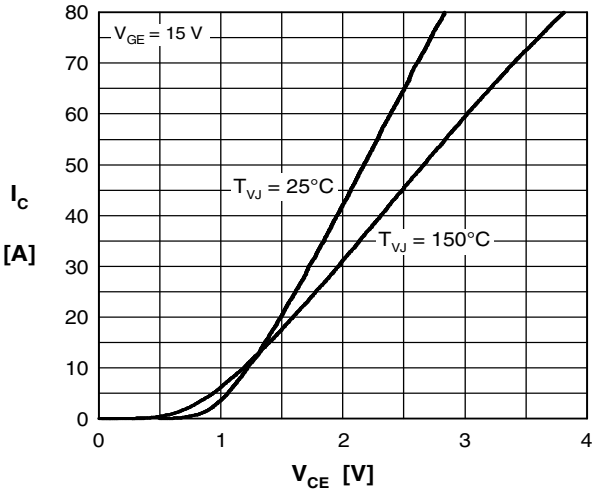


Fig. 1 Typ. output characteristics

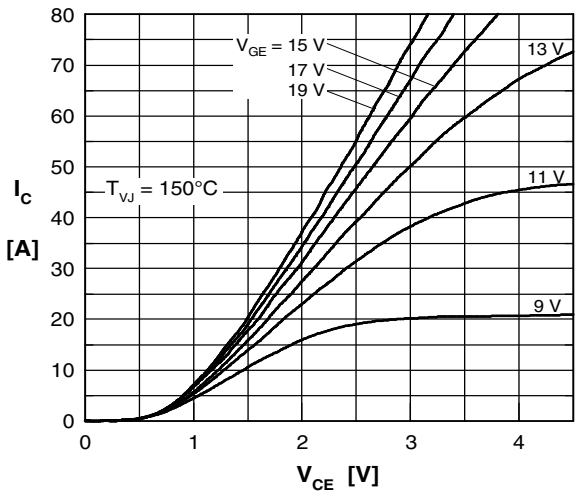


Fig. 2 Typ. output characteristics

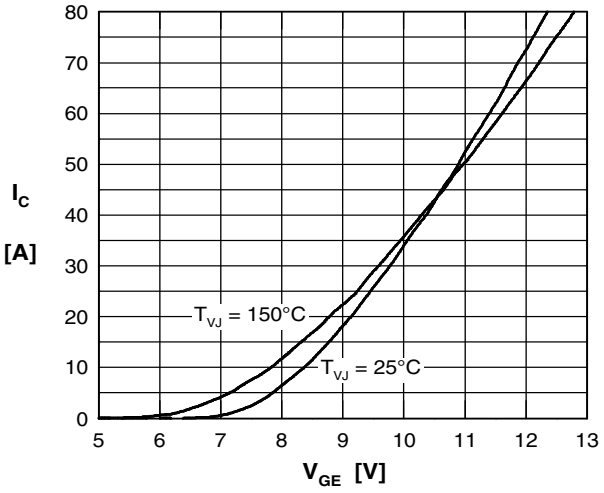


Fig. 3 Typ. transfer characteristics

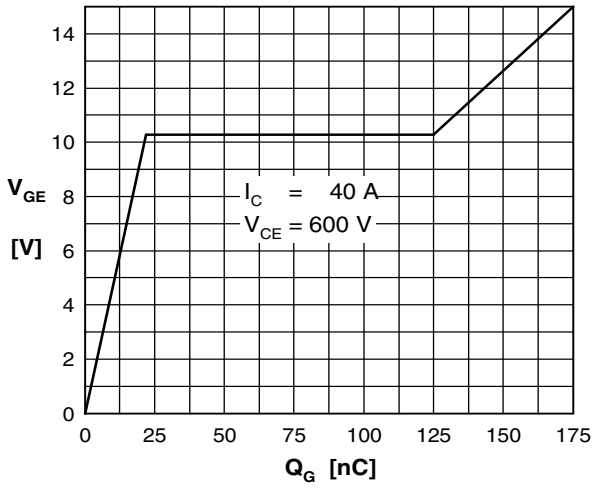


Fig. 4 Typ. turn-on gate charge

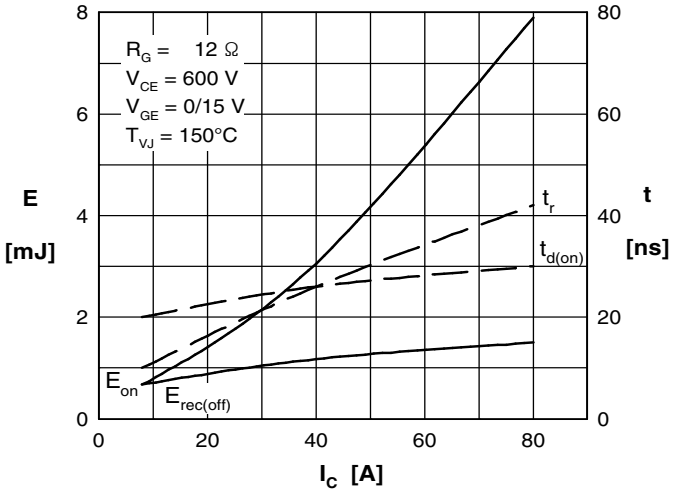


Fig. 5 Typ. turn-on energy & switching times versus collector current

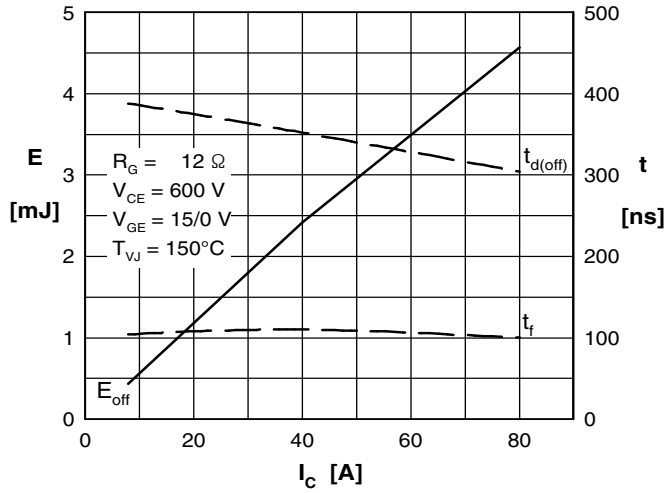


Fig. 6 Typ. turn-off energy & switching times versus collector current

IGBT

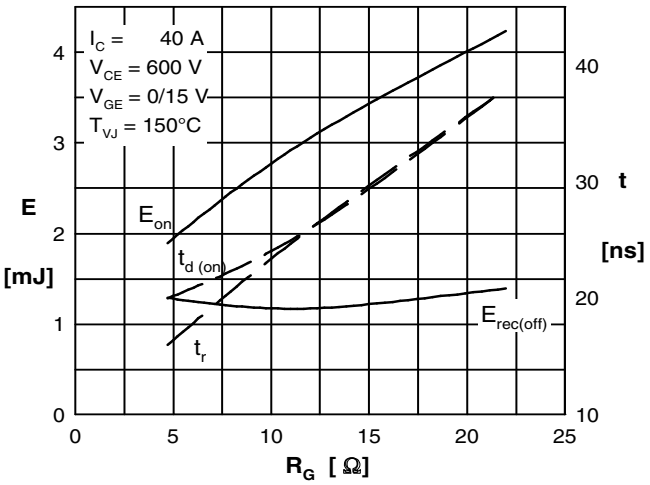


Fig. 7 Typ. turn-on energy and switching times versus gate resistor

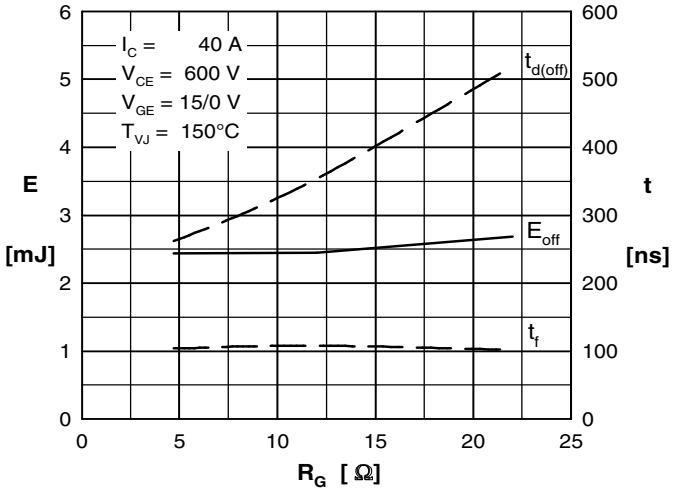


Fig. 8 Typ. turn-off energy and switching times versus gate resistor

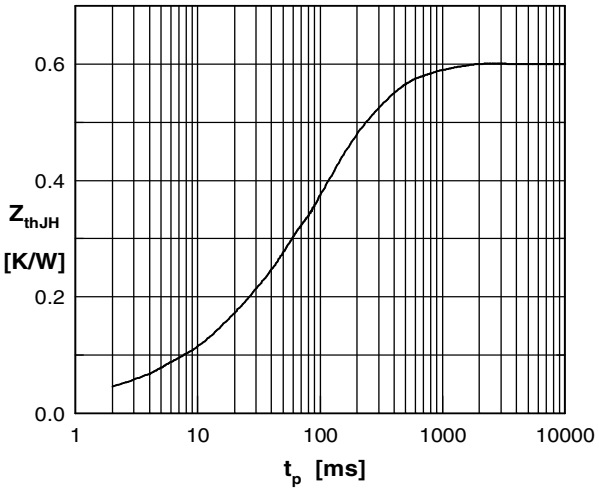


Fig. 9 Typ. transient thermal impedance

DIODE

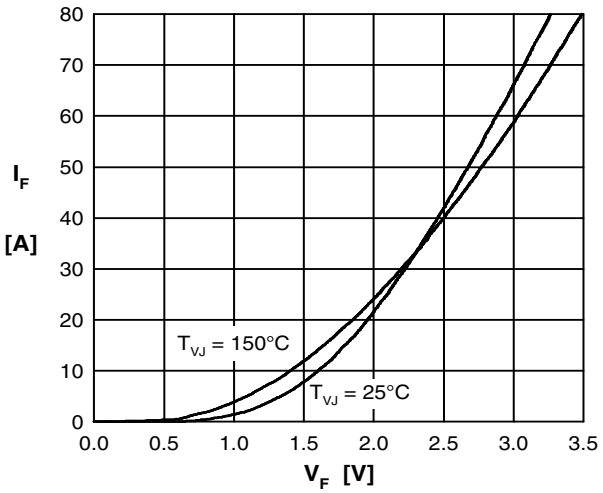


Fig. 10 Typ. forward characteristics

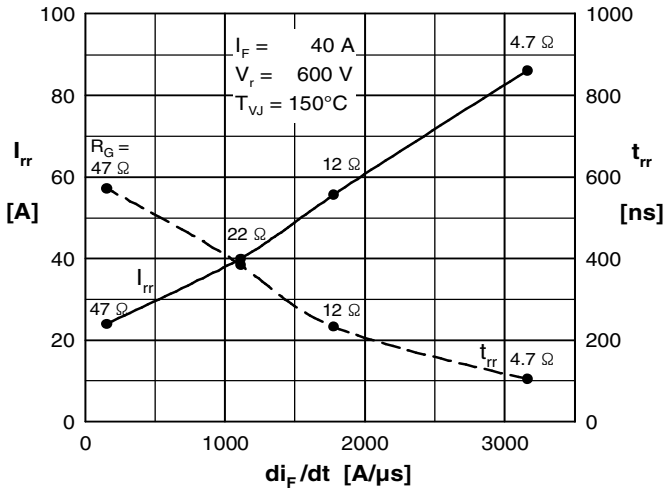


Fig. 11 Typ. reverse recovery characteristics

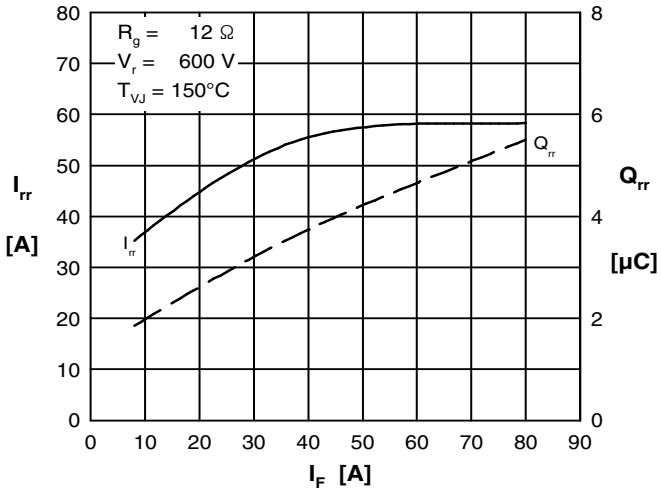


Fig. 12 Typ. reverse recovery characteristics

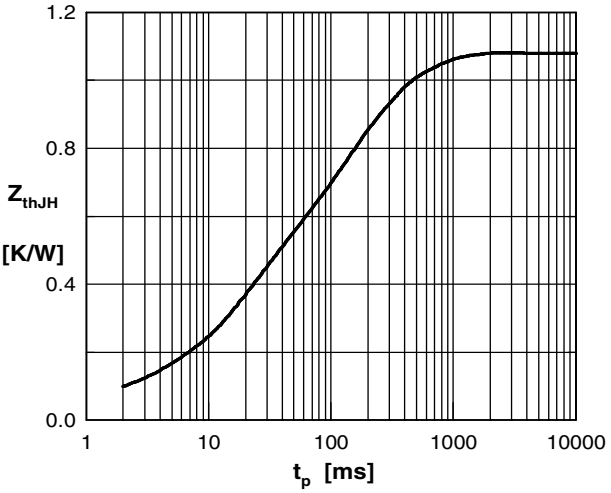


Fig. 13 Typ. transient thermal impedance