



EP2 Power Module

APP075B12TFPP

**PRELIMINARY
DATASHEET**

V0.1, 2023/01



Applications

- Motor Drives
- Inverters

Electrical Features

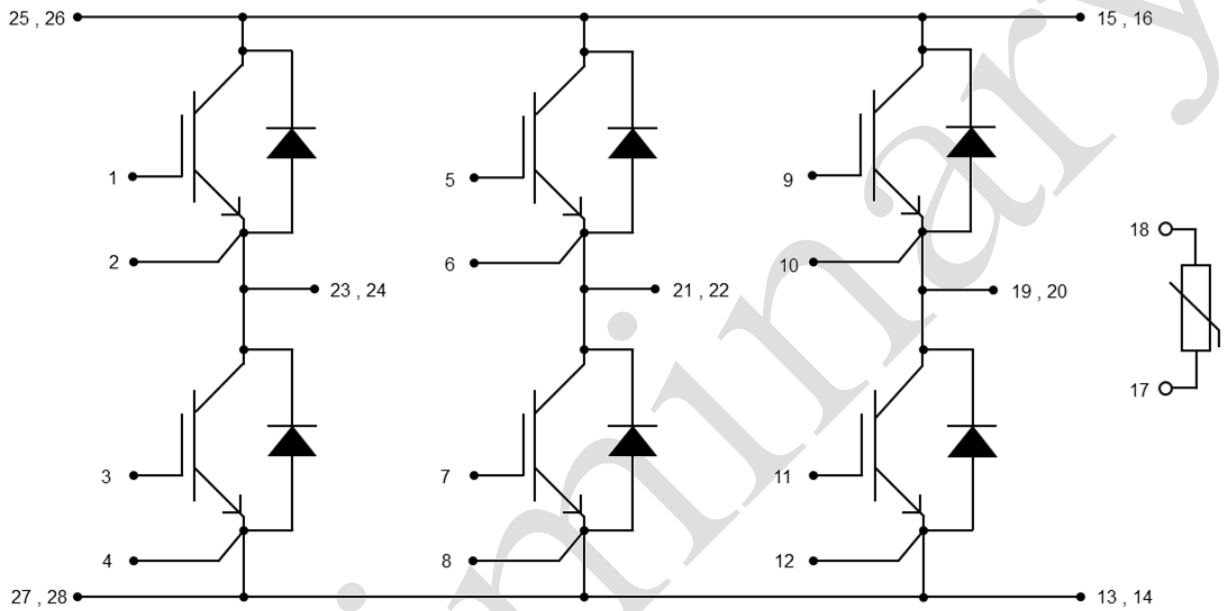
- $T_j \text{ op} = 150^\circ\text{C}$
- Low Inductive Design
- Blocking voltage 1200V
- Low V_{CEsat}

Mechanical Features

- Low Thermal Resistance
- High Power
- Temperature sense included
- Pb-free device and RoHS compliant



Circuit Diagram





IGBT Inverter

Maximum Rated Values

Parameter	Conditions	Symbol	Values	Unit
Collector-emitter voltage	$T_j = 25^\circ\text{C}$	V_{CES}	1200	V
Gate-emitter peak voltage		V_{GES}	± 20	V
Implemented collector current		I_{CN}	75	A
Repetitive peak collector current	$t_p = 1 \text{ ms}$	I_{CRM}	150	A

Characteristics Values

Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
Collector-emitter saturation voltage	$I_C = 75\text{A}, V_{GE} = 15\text{V}$ $I_C = 75\text{A}, V_{GE} = 15\text{V}$	$V_{CE,sat}$		1.75 2.15	2.15	V
Gate threshold voltage	$I_C = 2.40\text{mA}, V_{CE} = V_{GE}$	V_{Geth}	5.3	5.9	6.5	V
Collector-emitter cut-off current	$V_{CE} = 1200\text{V}, V_{GE} = 0\text{V}$	I_{CES}			1.0	mA
Gate-emitter leakage current	$V_{CE} = 0\text{V}, V_{GE} = 20\text{V}$	I_{GES}			100	nA
Gate Charge	$V_{GE} = -15 \text{ V} / + 15 \text{ V}, V_{CE} = 600\text{V}$	Q_g		TBD		μC
Input capacitance	$f = 1\text{MHz}, V_{CE} = 25 \text{ V}, V_{GE} = 0\text{V}$	C_{ies}		6.0		nF
Output capacitance	$f = 1\text{MHz}, V_{CE} = 25 \text{ V}, V_{GE} = 0\text{V}$	C_{oes}		1.1		nF
Reverse transfer capacitance	$f = 1\text{MHz}, V_{CE} = 25 \text{ V}, V_{GE} = 0\text{V}$	C_{res}		0.1		nF
Turn-on delay time, inductive load	$I_C = 75\text{A}, V_{CE} = 600\text{V},$ $V_{GE} = -15 \text{ V} / + 15 \text{ V}$ $R_{GON} = 2.0 \Omega$	$t_{d(on)}$		TBD		μs
Rise time, inductive load	$I_C = 75\text{A}, V_{CE} = 600\text{V},$ $V_{GE} = -15 \text{ V} / + 15 \text{ V}$ $R_{GON} = 2.0 \Omega$	t_r		TBD		μs



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Parameter	Conditions		Symbol	Min.	Typ.	Max.	Unit
Turn-on energy loss per pulse	$I_C = 75A, V_{CE} = 600V,$ $L_S = 30 \text{ nH}$ $V_{GE} = -15 \text{ V} / + 15 \text{ V},$ $R_{GON} = 2.0 \Omega$ $di/dt = \text{TBD A}/\mu\text{s} (25^\circ\text{C})$	$T_j = 25^\circ\text{C}$	E_{on}		TBD		mJ
Turn-off delay time, inductive load	$I_C = 75A, V_{CE} = 600V,$ $V_{GE} = -15 \text{ V} / + 15 \text{ V}$ $R_{Goff} = 2.0 \Omega$	$T_j = 25^\circ\text{C}$	$t_{d(off)}$		TBD		μs
Fall time, inductive load	$I_C = 75A, V_{CE} = 600V,$ $V_{GE} = -15 \text{ V} / + 15 \text{ V}$ $R_{Goff} = 2.0 \Omega$	$T_j = 25^\circ\text{C}$	t_f		TBD		μs
Turn-off energy loss per pulse	$I_C = 75A, V_{CE} = 600V,$ $L_S = 30 \text{ nH}$ $V_{GE} = -15 \text{ V} / + 15 \text{ V},$ $R_{Goff} = 2.0 \Omega$ $dv/dt = \text{TBD V}/\mu\text{s} (25^\circ\text{C})$	$T_j = 25^\circ\text{C}$	E_{off}		TBD		mJ
SC data	$V_{GE} \leq 15 \text{ V}, V_{CC} = 800 \text{ V}$ $t_p \leq 10 \mu\text{s}$	$T_j = 25^\circ\text{C}$	I_{sc}		TBD		A
Thermal resistance, junction to case	Per IGBT		R_{thJC}		0.20		K/W
Thermal resistance, case to heatsink	Per IGBT		R_{thCH}		0.30		K/W



Diode Inverter

Maximum Rated Values

Parameter	Conditions	Symbol	Values	Unit
Repetitive peak reverse voltage	$T_j = 25^\circ\text{C}$	V_{RRM}	1200	V
Implemented forward current		I_{FN}	75	A
Repetitive peak forward current	$t_p = 1\text{ ms}$	I_{FRM}	150	A

Characteristics Values

Parameter	Conditions	Symbol	Typ.	Max.	Unit
Forward voltage	$I_F = 75\text{A}, V_{GE} = 0\text{V}$ $T_j = 25^\circ\text{C}$	V_F	1.65	2.10	V
	$I_F = 75\text{A}, V_{GE} = 0\text{V}$ $T_j = 150^\circ\text{C}$		1.70		
Recovered charge	$I_F = 75\text{A}, V_R = 600\text{V},$ $V_{GE} = -15\text{V},$ $-di_f/dt = \text{TBD A}/\mu\text{s} (25^\circ\text{C})$ $T_j = 25^\circ\text{C}$	Q_{rr}	TBD		μC
Reverse recovery energy	$I_F = 75\text{A}, V_R = 600\text{V},$ $V_{GE} = -15\text{V},$ $-di_f/dt = \text{TBD A}/\mu\text{s} (25^\circ\text{C})$ $T_j = 25^\circ\text{C}$	E_{rec}	TBD		mJ
Peak reverse recovery current	$I_F = 75\text{A}, V_R = 600\text{V},$ $V_{GE} = -15\text{V},$ $-di_f/dt = \text{TBD A}/\mu\text{s} (25^\circ\text{C})$ $T_j = 25^\circ\text{C}$	I_{RM}	TBD		A
Thermal resistance, junction to case	Per diode	R_{thJC}		0.55	
Thermal resistance, case to heatsink	Per diode	R_{thCH}		0.18	



NTC-Thermistor

Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
Rated resistance	$T_c = 25^\circ\text{C}$	R_{25}		5.0		k Ω
Resistance tolerance	$T_c = 100^\circ\text{C}$	$\Delta R/R$	-5		5	%
B-value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298.15 \text{ K}))]$	$B_{25/50}$		3375		K
B-value	$R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298.15 \text{ K}))]$	$B_{25/80}$		3411		K
B-value	$R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298.15 \text{ K}))]$	$B_{25/100}$		3433		K

Module

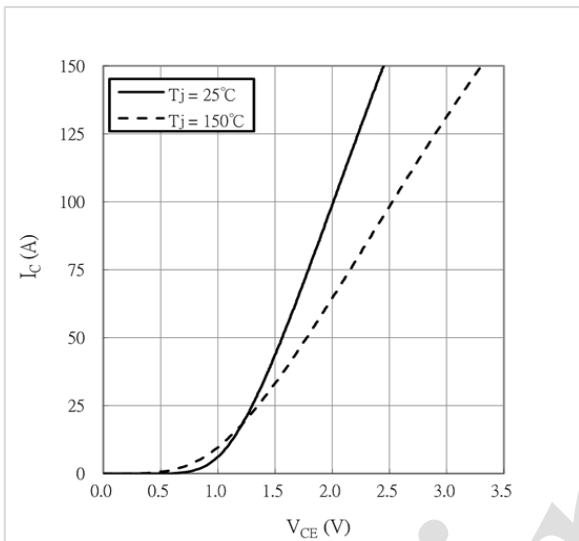
Parameter	Conditions	Symbol	Value	Unit
Isolation test voltage	RMS, f = 50 Hz, t = 1 min	V_{ISOL}	TBD	kV
Module baseplate material			Cu + Ni	
Module internal isolation material			Al_2O_3	
Creepage distance	Terminal to Terminal	d_{cree}	10.0	mm
Clearance	Terminal to Terminal	d_{clear}	7.5	mm
Comparative tracking index ¹⁾		CTI	> 200	

Parameter	Conditions	Symbol	Min.	Typ.	Max.	Unit
Module stray inductance				TBD		
Storage temperature		T_{stg}	-40		125	$^\circ\text{C}$
Weight		G		180		g

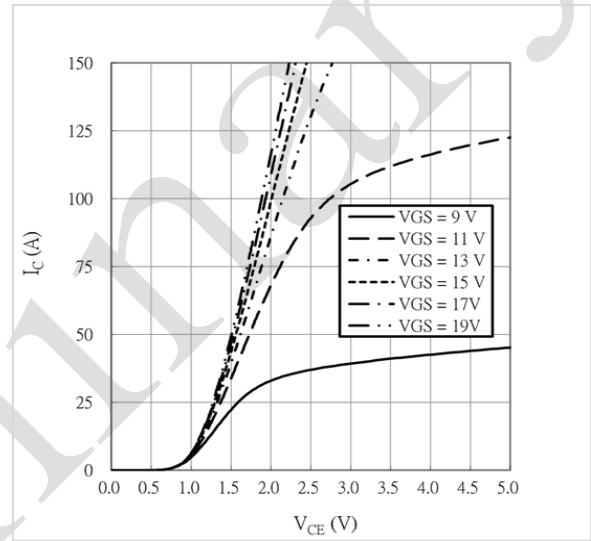
¹⁾ Extracted by following UL 746A

Characteristics Diagrams

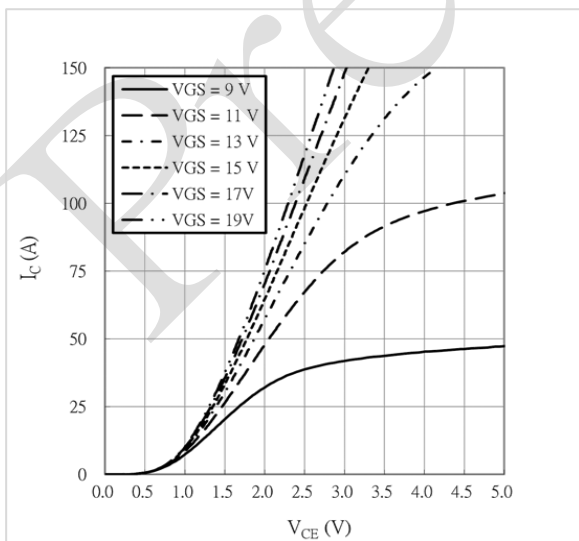
Output characteristics IGBT, Inverter
 $V_{GE} = 15 \text{ V}$, $I_C = f(V_{CE})$



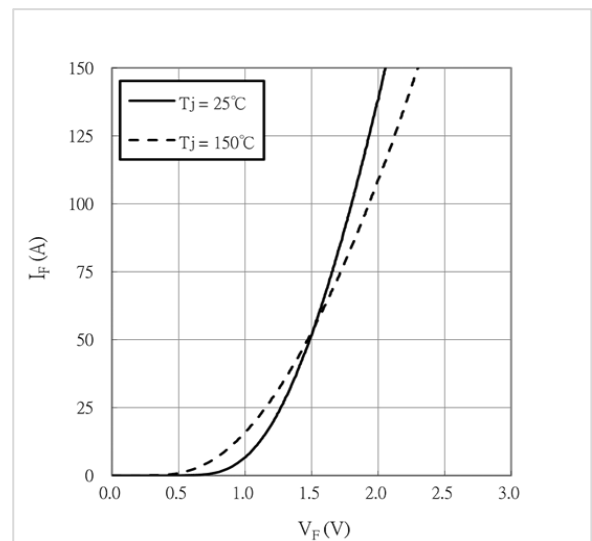
Output characteristics IGBT, Inverter
 $T_j = 25^\circ\text{C}$, $I_C = f(V_{CE})$



Output characteristics IGBT, Inverter
 $T_j = 150^\circ\text{C}$, $I_C = f(V_{CE})$



Forward characteristics of Diode, Inverter
 $I_F = f(V_F)$

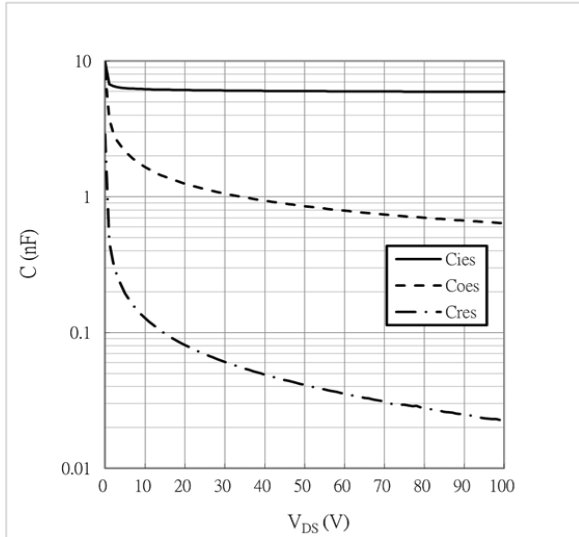




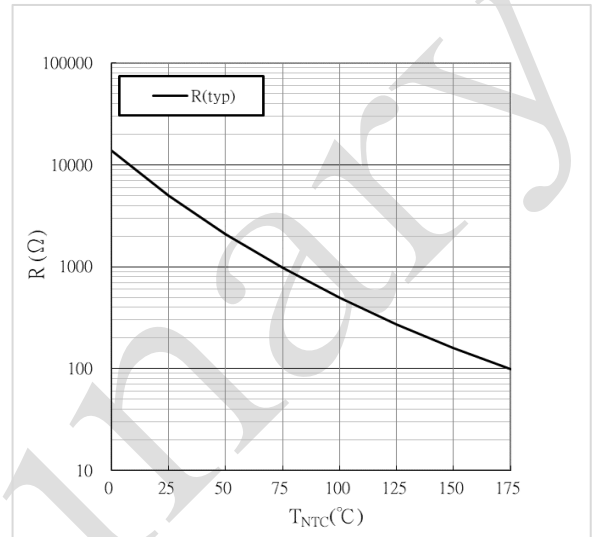
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Capacitance characteristics IGBT, inverter
 $V_{GE} = 0\text{ V}$, $T_j = 25^\circ\text{C}$, $f = 1\text{ MHz}$



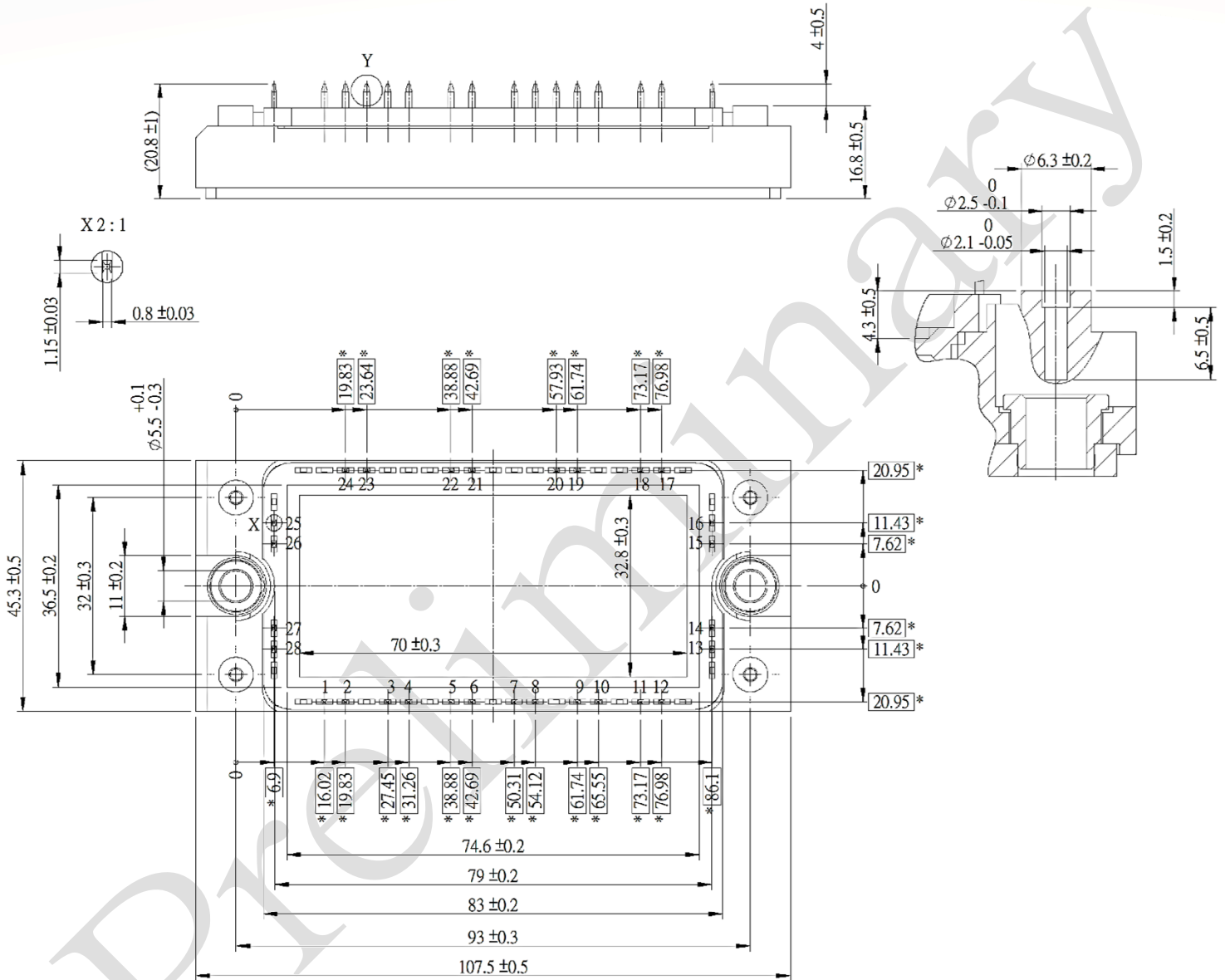
NTC-Thermistor-temperature characteristic



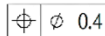


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Package Outlines



* = alle Maße mit einer Toleranz von
 * = all dimensions with tolerance of



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Edition 2023-01

**Published by
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