

2nd Generation thinQ!TM SiC Schottky Diode

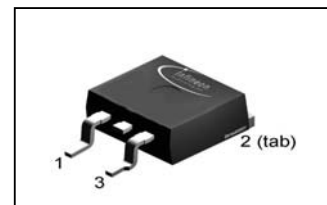
Features

- Revolutionary semiconductor material - Silicon Carbide
- Switching behavior benchmark
- No reverse recovery/ No forward recovery
- No temperature influence on the switching behavior
- High surge current capability
- Pb-free lead plating; RoHs compliant
- Qualified according to JEDEC¹⁾ for target applications
- Breakdown voltage tested at 5mA²⁾

Product Summary

V_{DC}	600	V
Q_c	24	nC
I_F	10	A

D²PAK



thinQ! 2G Diode designed for fast switching applications like:

- CCM PFC
- Motor Drives

Type	Package	Marking	Pin 2	Pin 3
IDB10S60C	D ² PAK	D10S60C	C	A

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

Parameter	Symbol	Conditions	Value	Unit
Continuous forward current	I_F	$T_C < 135\text{ }^\circ\text{C}$	10	A
RMS forward current	$I_{F,RMS}$	$f=50\text{ Hz}$	15	
Surge non-repetitive forward current, sine halfwave	$I_{F,SM}$	$T_C=25\text{ }^\circ\text{C}$, $t_p=10\text{ ms}$	76	
Repetitive peak forward current	$I_{F,RM}$	$T_j=150\text{ }^\circ\text{C}$, $T_C=100\text{ }^\circ\text{C}$, $D=0.1$	32	
Non-repetitive peak forward current	$I_{F,max}$	$T_C=25\text{ }^\circ\text{C}$, $t_p=10\text{ }\mu\text{s}$	350	
i^2t value	$\int i^2 dt$	$T_C=25\text{ }^\circ\text{C}$, $t_p=10\text{ ms}$	29	A ² s
Repetitive peak reverse voltage	V_{RRM}		600	V
Diode ruggedness dv/dt	dv/dt	$V_R=0\dots 480\text{V}$	50	V/ns
Power dissipation	P_{tot}	$T_C=25\text{ }^\circ\text{C}$	83	W
Operating and storage temperature	T_j, T_{stg}		-55 ... 175	$^\circ\text{C}$

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Thermal characteristics

Thermal resistance, junction - case	R_{thJC}		-	-	1.8	K/W
Thermal resistance, junction - ambient	R_{thJA}	SMD version, device on PCB, minimal Footprint	-	-	62	
		SMD version, device on PCB, 6 cm ² cooling area ³⁾	-	35	-	
Soldering temperature, reflowsoldering @ 10sec.	T_{sold}	reflow MSL1	-	-	260	°C

Electrical characteristics, at $T_j=25\text{ °C}$, unless otherwise specified

Static characteristics

DC blocking voltage	V_{DC}	$I_R=0.14\text{ mA}$	600	-	-	V
Diode forward voltage	V_F	$I_F=10\text{ A}$, $T_j=25\text{ °C}$	-	1.5	1.7	
		$I_F=10\text{ A}$, $T_j=150\text{ °C}$	-	1.7	2.1	
Reverse current	I_R	$V_R=600\text{ V}$, $T_j=25\text{ °C}$	-	1.4	140	μA
		$V_R=600\text{ V}$, $T_j=150\text{ °C}$	-	5	1400	

AC characteristics

Total capacitive charge	Q_c	$V_R=400\text{ V}$, $I_F \leq I_{F,max}$, $di_F/dt=200\text{ A}/\mu\text{s}$,	-	24	-	nC
Switching time ⁴⁾	t_c	$T_j=150\text{ °C}$	-	-	<10	ns
Total capacitance	C	$V_R=1\text{ V}$, $f=1\text{ MHz}$	-	480	-	pF
		$V_R=300\text{ V}$, $f=1\text{ MHz}$	-	60	-	
		$V_R=600\text{ V}$, $f=1\text{ MHz}$	-	60	-	

¹⁾ J-STD20 and JESD22

²⁾ All devices tested under avalanche conditions, for a time periode of 5ms, at 5mA.

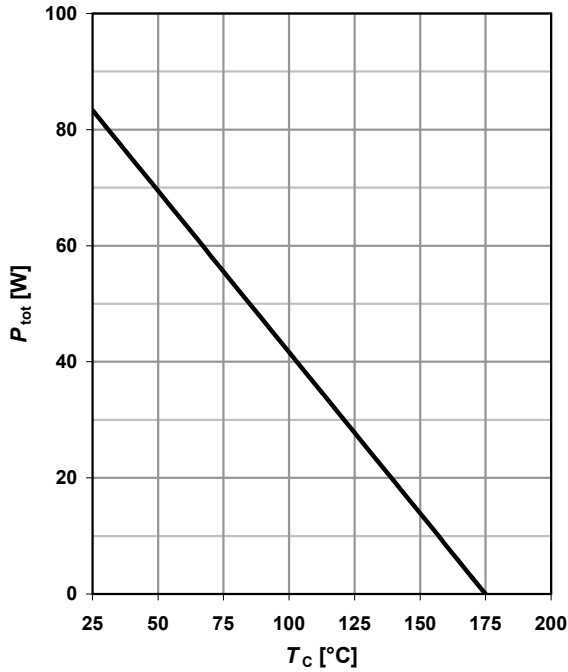
³⁾ Device on 40mm*40mm*1.5mm epox PCB FR4 with 6cm² (one layer, 70μm thick) copper area for drain connection. PCB is vertikal with out blown air.

⁴⁾ t_c is the time constant for the capacitive displacement current waveform (independent from T_j , I_{LOAD} and di/dt), different from t_{rr} , which is dependent on T_j , I_{LOAD} , di/dt . No reverse recovery time constant t_{rr} due to absence of minority carrier injection.

⁵⁾ Only capacitive charge occuring, guaranteed by design.

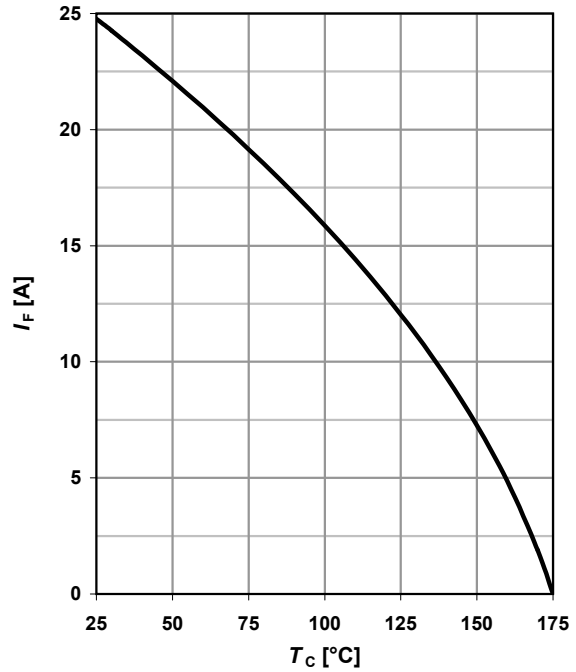
1 Power dissipation

$$P_{tot}=f(T_C)$$



2 Diode forward current

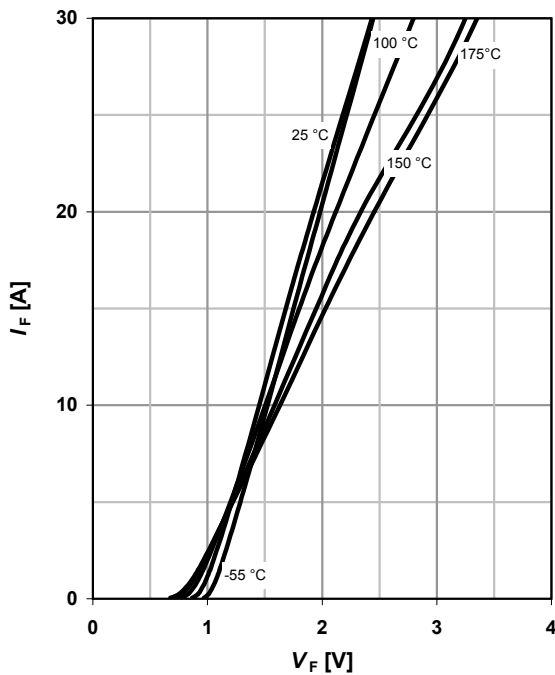
$$I_F=f(T_C); T_j \leq 175 \text{ °C}$$



3 Typ. forward characteristic

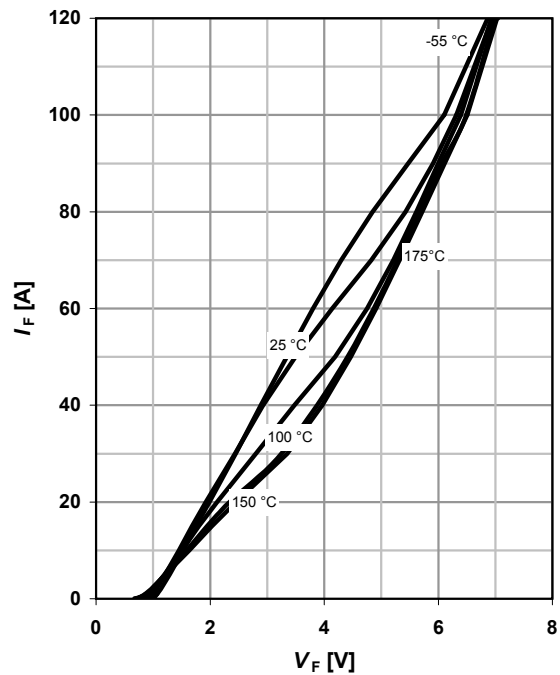
$$I_F=f(V_F); t_p=400 \mu s$$

parameter: T_j



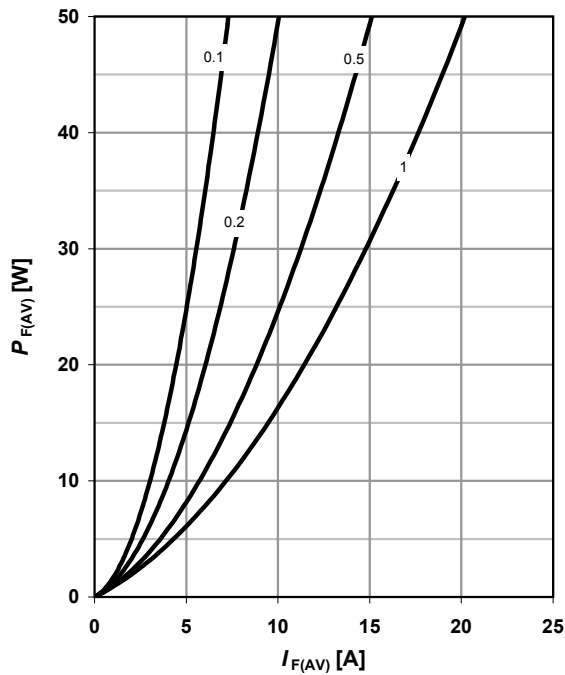
4 Typ. forward characteristic in surge current mode

$$I_F=f(V_F); t_p=400 \mu s; \text{ parameter: } T_j$$



5 Typ. forward power dissipation vs. average forward current

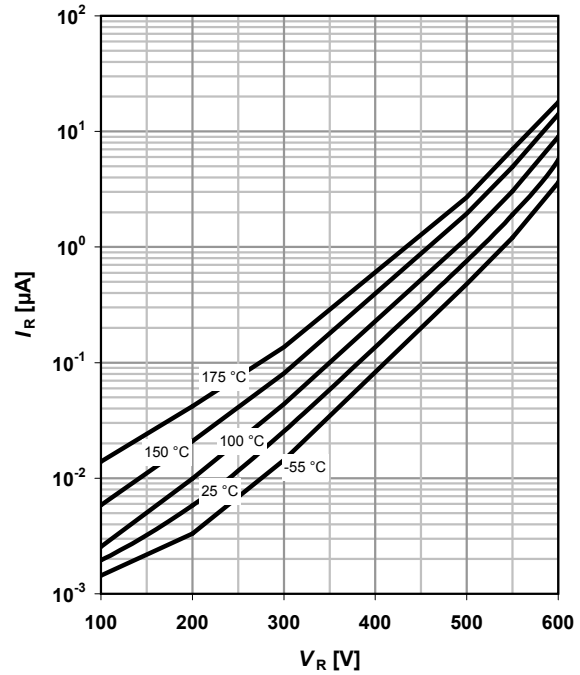
$P_{F(AV)} = f(I_F)$, $T_C = 100\text{ }^\circ\text{C}$, parameter: $D = t_p/T$



6 Typ. reverse current vs. reverse voltage

$I_R = f(V_R)$

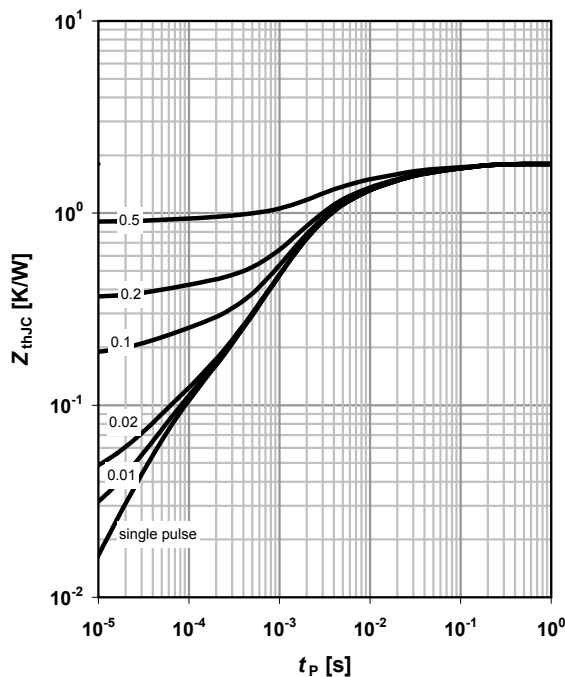
parameter: T_j



7 Transient thermal impedance

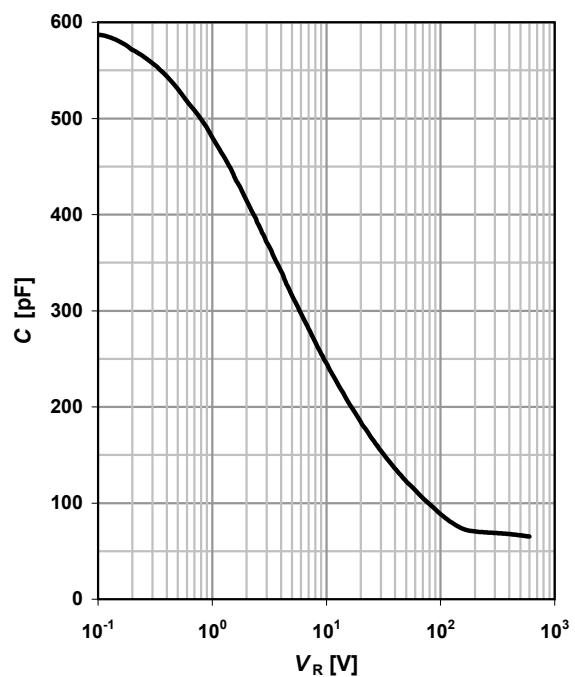
$Z_{thJC} = f(t_p)$

parameter: $D = t_p/T$



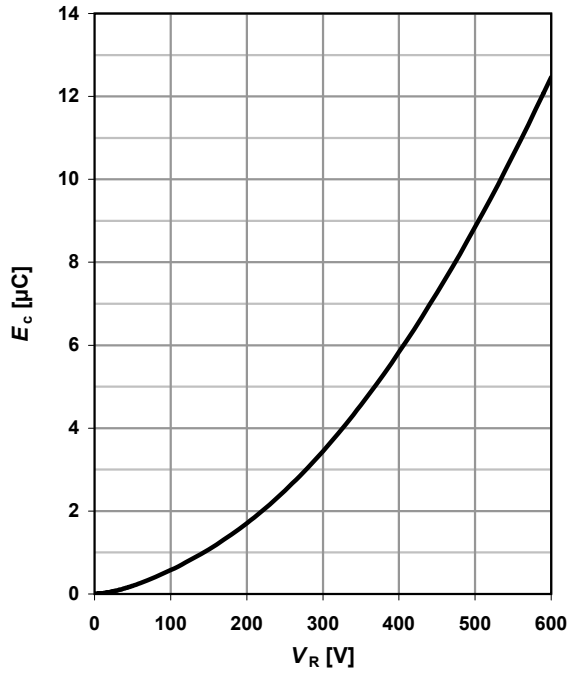
8 Typ. capacitance vs. reverse voltage

$C = f(V_R)$; $T_C = 25\text{ }^\circ\text{C}$, $f = 1\text{ MHz}$



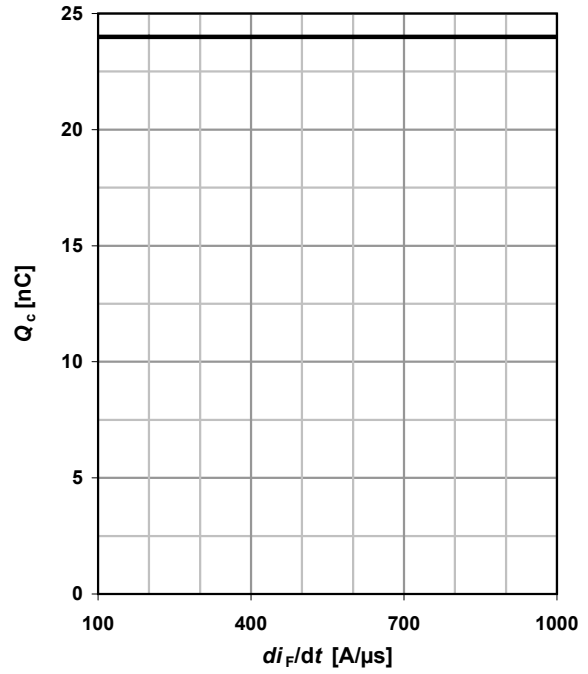
9 Typ. C stored energy

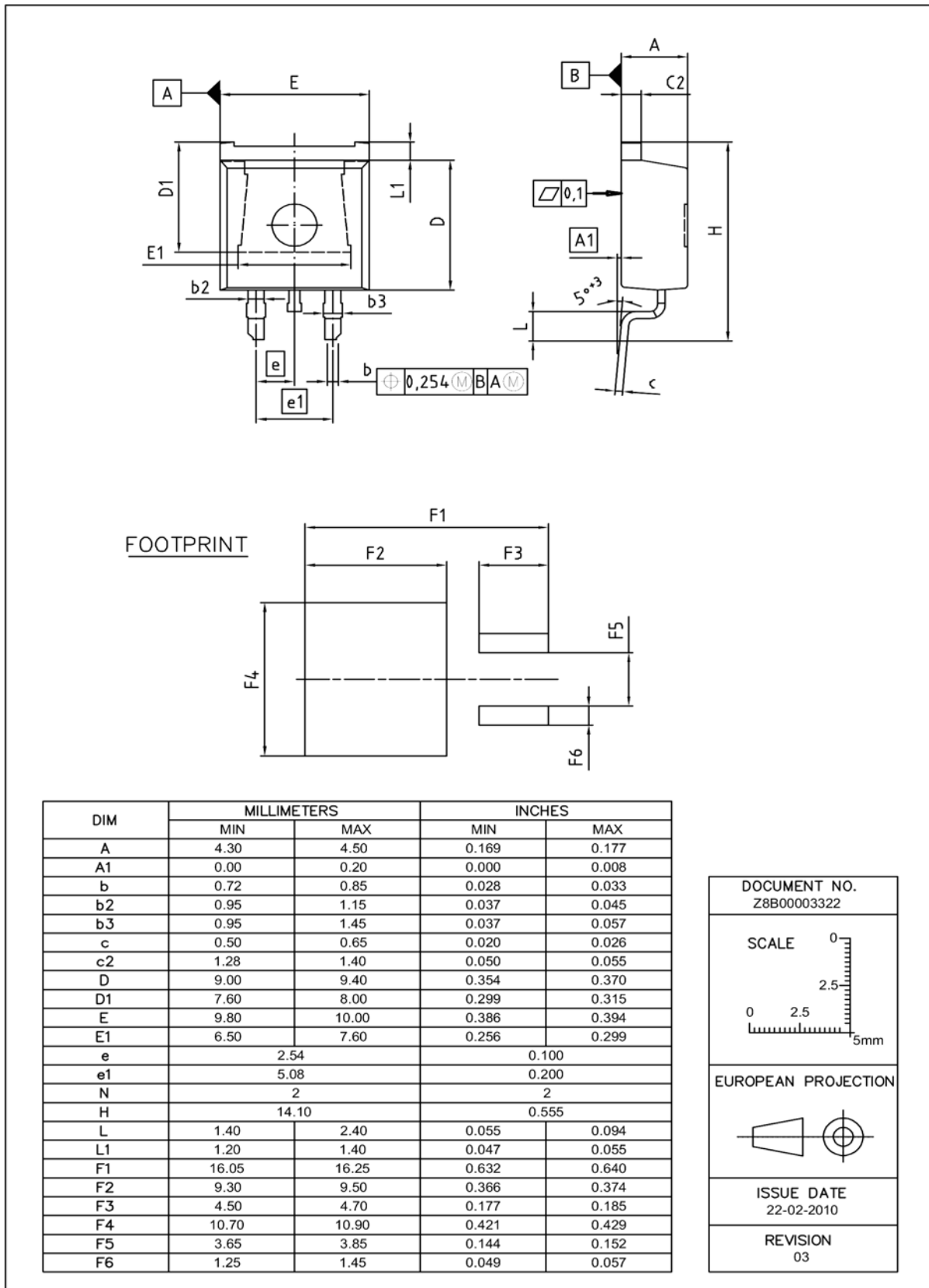
$$E_C = f(V_R)$$



10 Typ. Capacitive charge vs. current slope

$$Q_C = f(di_F/dt)^{0.5}; T_j = 150\text{ °C}; I_F \leq I_{F,max}$$



PG-TO220-3-45 (D²PAK): Outline


Dimensions in mm/inches

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