

Fast Switching EmCon Diode

Feature

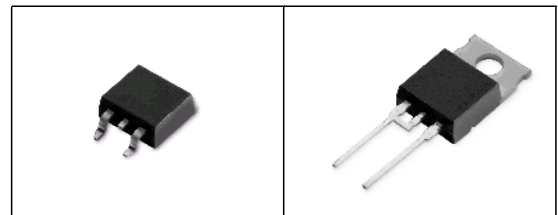
- 600 V EmCon technology
- Fast recovery
- Soft switching
- Low reverse recovery charge
- Low forward voltage
- 175°C operating temperature
- Easy paralleling

Product Summary

V_{RRM}	600	V
I_F	23	A
V_F	1.5	V
T_{jmax}	175	°C

P-TO220-3.SMD

P-TO220-2-2.



Type	Package	Ordering Code	Marking	Pin 1	PIN 2	PIN 3
IDP23E60	P-TO220-2-2.	Q67040-S4486	D23E60	C	A	-
IDB23E60	P-TO220-3.SMD	Q67040-S4487	D23E60	NC	C	A

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

Parameter	Symbol	Value	Unit
Repetitive peak reverse voltage	V_{RRM}	600	V
Continuous forward current	I_F		A
$T_C=25\text{ }^\circ\text{C}$		41	
$T_C=90\text{ }^\circ\text{C}$		28	
Surge non repetitive forward current	I_{FSM}	89	
$T_C=25\text{ }^\circ\text{C}$, $t_p=10\text{ ms}$, sine halfwave			
Maximum repetitive forward current	I_{FRM}	65	
$T_C=25\text{ }^\circ\text{C}$, t_p limited by T_{jmax} , $D=0.5$			
Power dissipation	P_{tot}		W
$T_C=25\text{ }^\circ\text{C}$		115	
$T_C=90\text{ }^\circ\text{C}$		65	
Operating and storage temperature	T_j, T_{stg}	-55... +175	°C
Soldering temperature	T_S	255	°C
1.6mm(0.063 in.) from case for 10s			

Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Thermal resistance, junction - case	R_{thJC}	-	-	1.3	K/W
SMD version, device on PCB:	R_{thJA}				
@ min. footprint		-	-	75	
@ 6 cm ² cooling area ¹⁾		-	-	50	

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Reverse leakage current	I_R				μA
$V_R=600\text{V}, T_j=25\text{ }^\circ\text{C}$		-	-	50	
$V_R=600\text{V}, T_j=150\text{ }^\circ\text{C}$		-	-	1900	
Forward voltage drop	V_F				V
$I_F=23\text{A}, T_j=25\text{ }^\circ\text{C}$		-	1.5	2	
$I_F=23\text{A}, T_j=150\text{ }^\circ\text{C}$		-	1.5	-	

¹Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical without blown air.

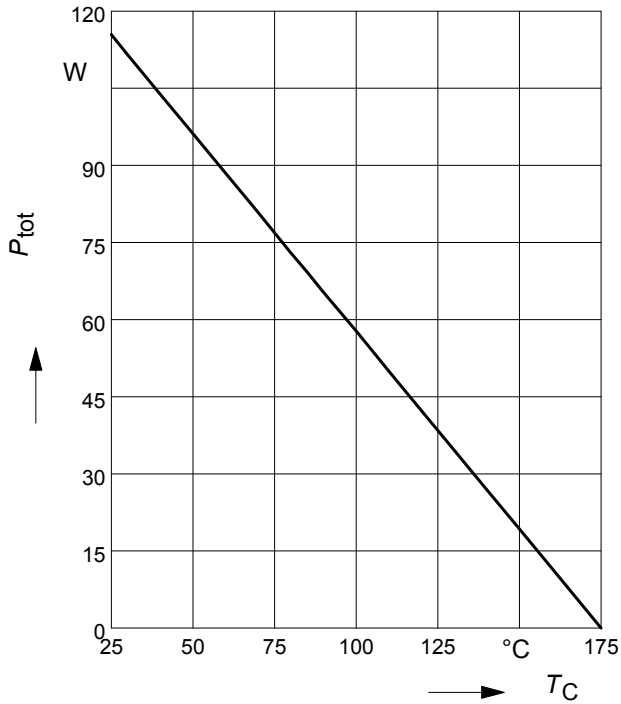
Electrical Characteristics, at $T_j = 25\text{ }^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Reverse recovery time $V_R=400\text{V}$, $I_F=23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=25^\circ\text{C}$ $V_R=400\text{V}$, $I_F=23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=125^\circ\text{C}$ $V_R=400\text{V}$, $I_F=23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=150^\circ\text{C}$	t_{rr}	-	120 164 170	-	ns
Peak reverse current $V_R=400\text{V}$, $I_F = 23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=25^\circ\text{C}$ $V_R=400\text{V}$, $I_F = 23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=125^\circ\text{C}$ $V_R=400\text{V}$, $I_F = 23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=150^\circ\text{C}$	I_{rrm}	-	17 19.5 21.5	-	A
Reverse recovery charge $V_R=400\text{V}$, $I_F=23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=25^\circ\text{C}$ $V_R=400\text{V}$, $I_F = 23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=125^\circ\text{C}$ $V_R=400\text{V}$, $I_F = 23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=150^\circ\text{C}$	Q_{rr}	-	970 1580 1770	-	nC
Reverse recovery softness factor $V_R=400\text{V}$, $I_F=23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=25^\circ\text{C}$ $V_R=400\text{V}$, $I_F=23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=125^\circ\text{C}$ $V_R=400\text{V}$, $I_F=23\text{A}$, $di_F/dt=1000\text{A}/\mu\text{s}$, $T_j=150^\circ\text{C}$	S	-	4.4 4.8 5	-	

1 Power dissipation

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

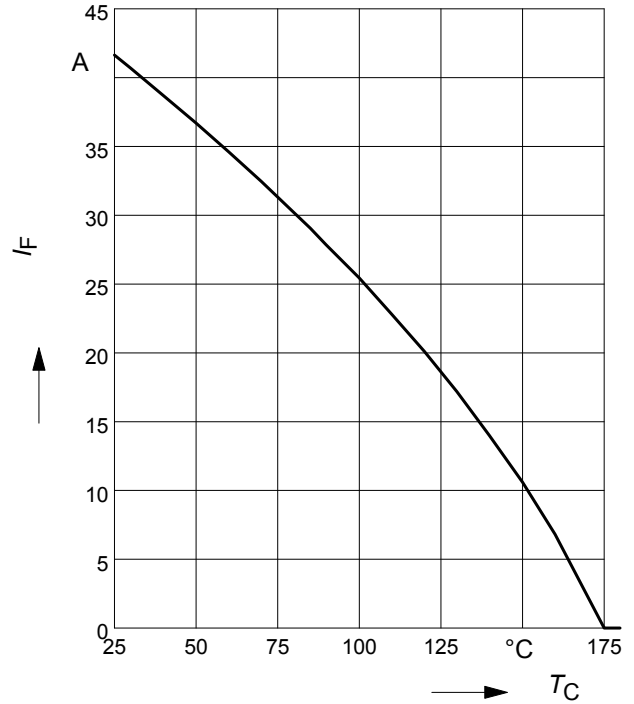
parameter: $T_j \leq 175^\circ\text{C}$



2 Diode forward current

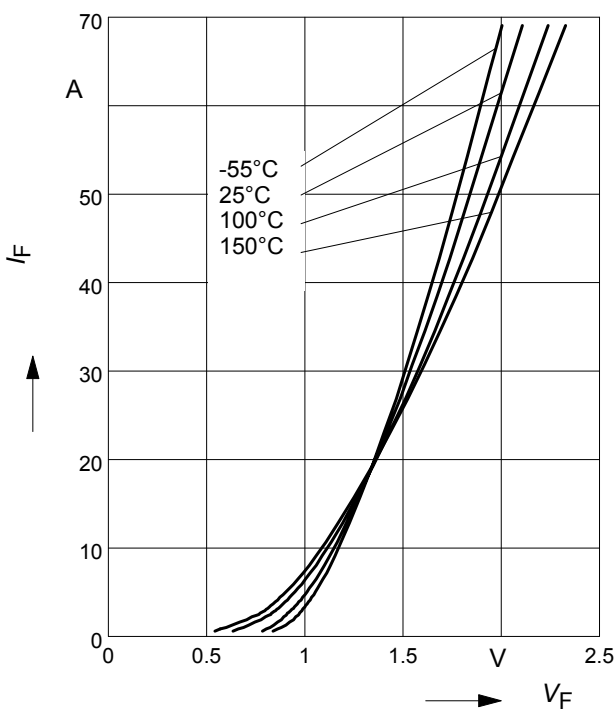
$$I_F = f(T_C)$$

parameter: $T_j \leq 175^\circ\text{C}$



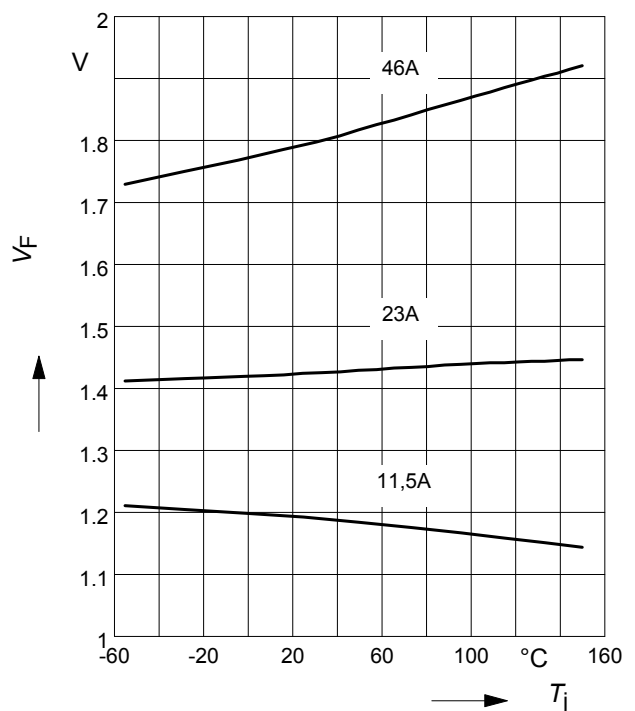
3 Typ. diode forward current

$$I_F = f(V_F)$$



4 Typ. diode forward voltage

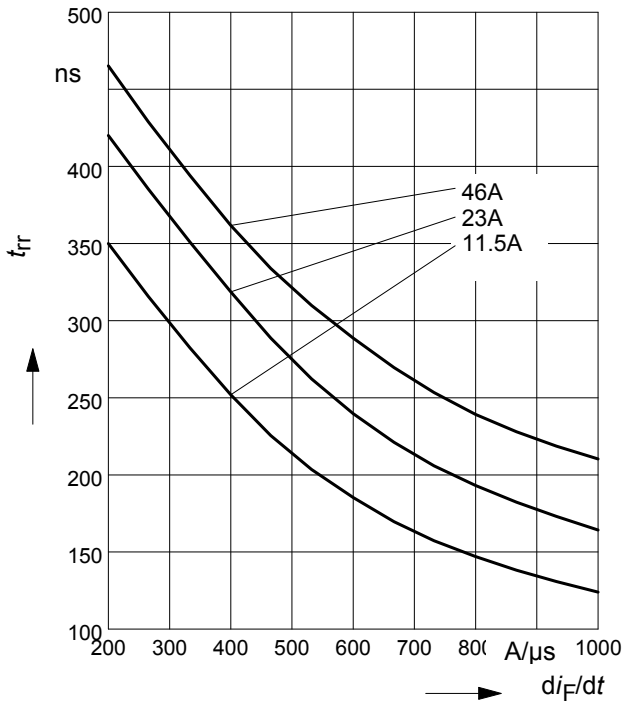
$$V_F = f(T_j)$$



5 Typ. reverse recovery time

$$t_{rr} = f(di_F/dt)$$

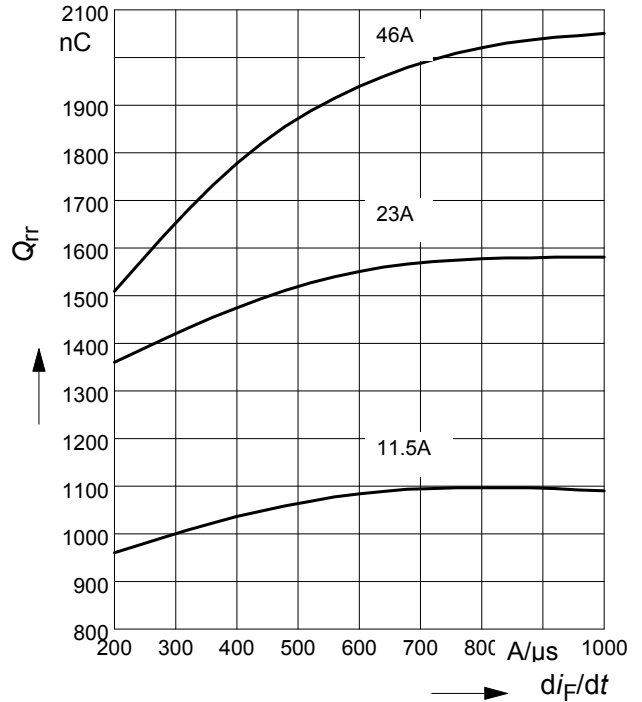
parameter: $V_R = 400V, T_j = 125^\circ C$



6 Typ. reverse recovery charge

$$Q_{rr} = f(di_F/dt)$$

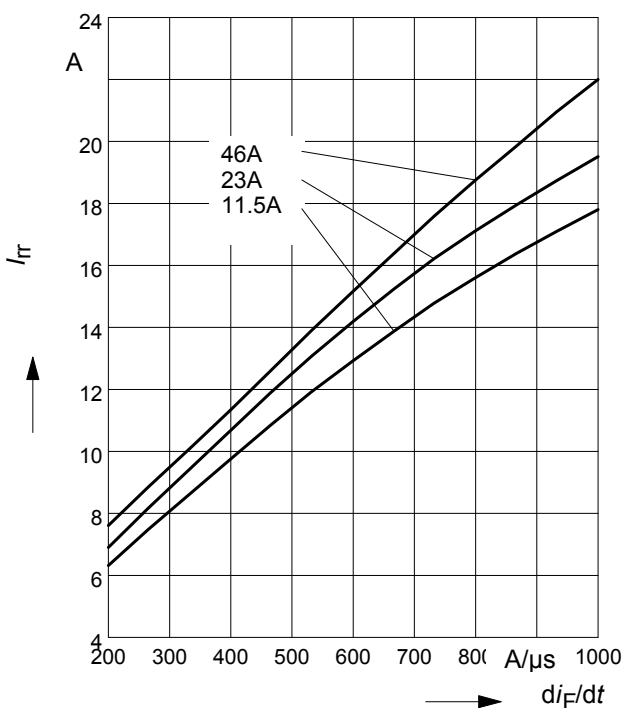
parameter: $V_R = 400V, T_j = 125^\circ C$



7 Typ. reverse recovery current

$$I_{rr} = f(di_F/dt)$$

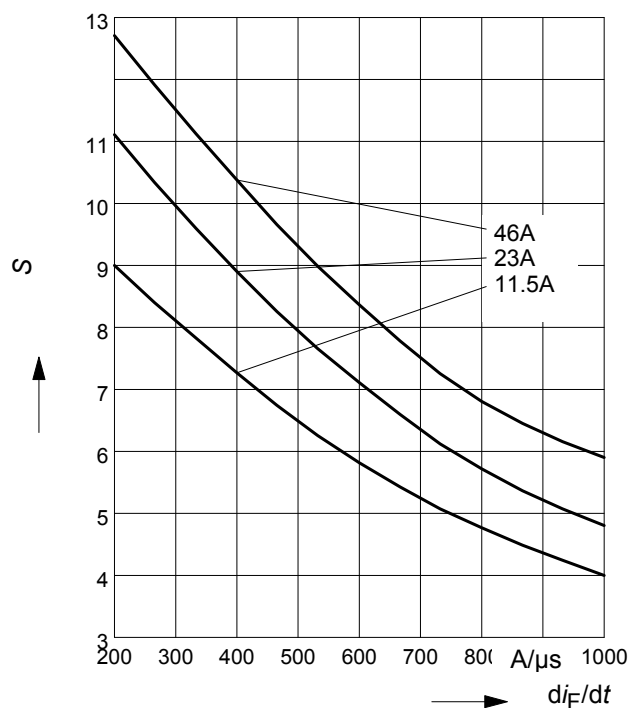
parameter: $V_R = 400V, T_j = 125^\circ C$



8 Typ. reverse recovery softness factor

$$S = f(di_F/dt)$$

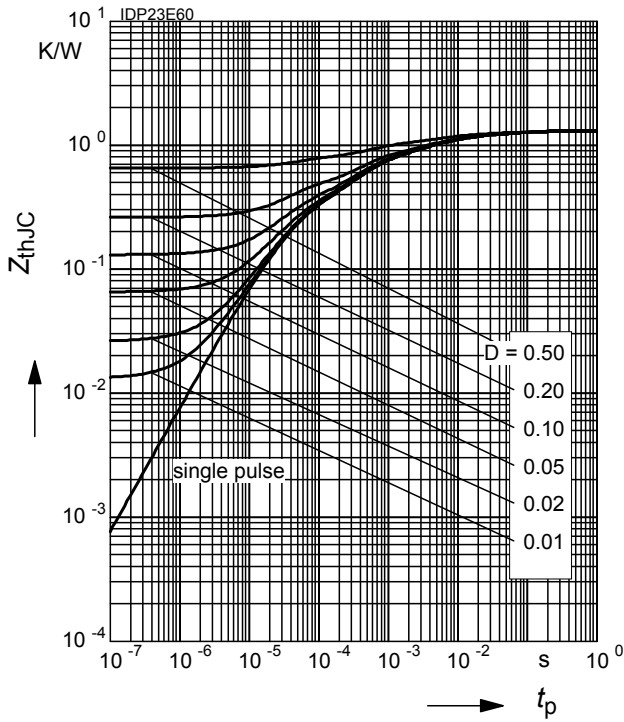
parameter: $V_R = 400V, T_j = 125^\circ C$



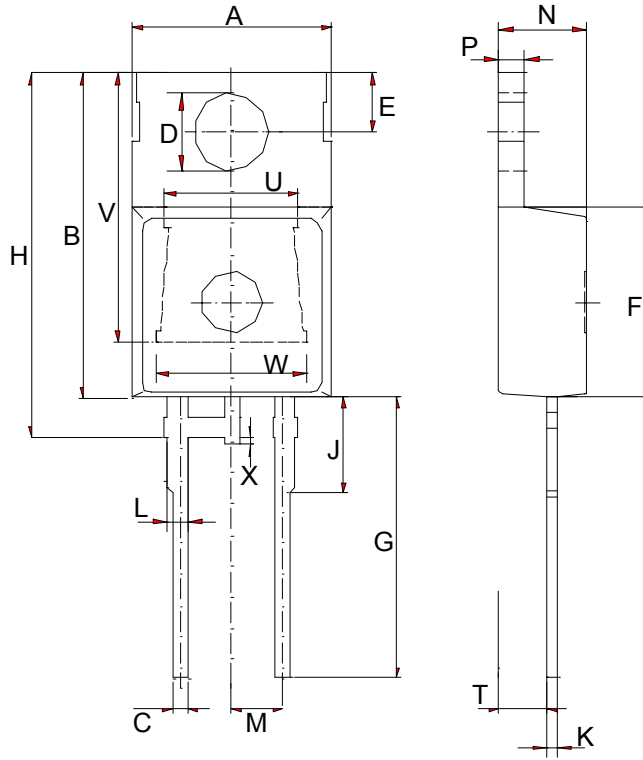
9 Max. transient thermal impedance

$$Z_{thJC} = f(t_p)$$

parameter : $D = t_p/T$

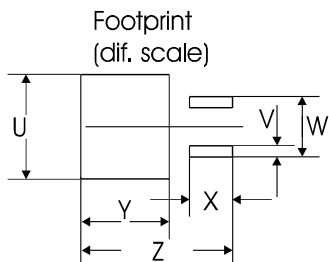
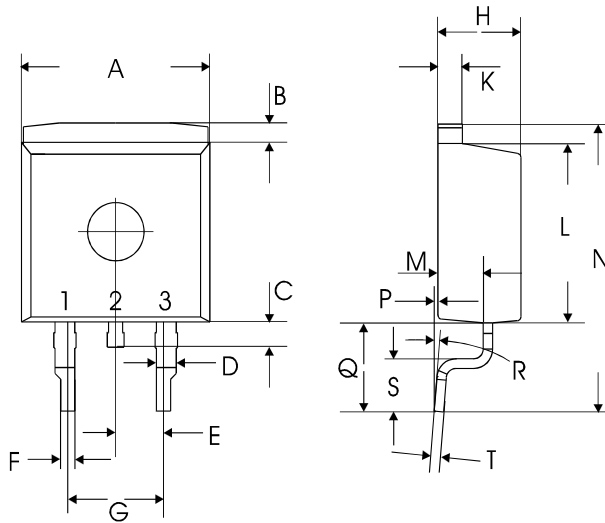


TO-220-2-2



symbol	dimensions			
	[mm]		[inch]	
	min	max	min	max
A	9.70	10.10	0.3819	0.3976
B	15.30	15.90	0.6024	0.6260
C	0.65	0.85	0.0256	0.0335
D	3.55	3.85	0.1398	0.1516
E	2.60	3.00	0.1024	0.1181
F	9.00	9.40	0.3543	0.3701
G	13.00	14.00	0.5118	0.5512
H	17.20	17.80	0.6772	0.7008
J	4.40	4.80	0.1732	0.1890
K	0.40	0.60	0.0157	0.0236
L	1.05 typ.		0.41 typ.	
M	2.54 typ.		0.1 typ.	
N	4.4 typ.		0.173 typ.	
P	1.10	1.40	0.0433	0.0551
T	2.4 typ.		0.095 typ.	
U	6.6 typ.		0.26 typ.	
V	13.0 typ.		0.51 typ.	
W	7.5 typ.		0.295 typ.	
X	0.00	0.40	0.0000	0.0157

TO-220-3-45 (P-TO220SMD)



symbol	dimensions			
	[mm]		[inch]	
	min	max	min	max
A	9.80	10.00	0.3858	0.3937
B	1.3 typ.		0.0512 typ.	
C	1.25	1.75	0.0492	0.0689
D	0.95	1.15	0.0374	0.0453
E	2.54 typ.		0.1 typ.	
F	0.72	0.85	0.0283	0.0335
G	5.08 typ.		0.2 typ.	
H	4.30	4.50	0.1693	0.1772
K	1.28	1.40	0.0504	0.0551
L	9.00	9.40	0.3543	0.3701
M	2.30	2.50	0.0906	0.0984
N	14.1 typ.		0.5551 typ.	
P	0.00	0.20	0.0000	0.0079
Q	3.30	3.90	0.1299	0.1535
R	8° max		8° max	
S	1.70	2.50	0.0669	0.0984
T	0.50	0.65	0.0197	0.0256
U	10.8 typ.		0.4252 typ.	
V	1.35 typ.		0.0532 typ.	
W	6.43 typ.		0.2532 typ.	
X	4.60 typ.		0.1811 typ.	
Y	9.40 typ.		0.3701 typ.	
Z	16.15 typ.		0.6358 typ.	

Published by
Infineon Technologies AG,
Bereichs Kommunikation
St.-Martin-Strasse 53,
D-81541 München
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