

## 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
$I_F$	45	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
IDP45E60	P-TO220-2-2.	Q67040-S4469	D45E60	C	A	-
IDB45E60	P-TO220-3.SMD	Q67040-S4375	D45E60	NC	C	A

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

Parameter	Symbol	Value	Unit
Repetitive peak reverse voltage	$V_{RRM}$	600	V
Continuous forward current	$I_F$	45	A
$T_C=25\text{ °C}$		71	
$T_C=90\text{ °C}$		47	
Surge non repetitive forward current	$I_{FSM}$	162	
$T_C=25\text{ °C}$ , $t_p=10\text{ ms}$ , sine halfwave			
Maximum repetitive forward current	$I_{FRM}$	111.5	
$T_C=25\text{ °C}$ , $t_p$ limited by $T_{jmax}$ , $D=0.5$			
Power dissipation	$P_{tot}$	187	W
$T_C=25\text{ °C}$		106	
$T_C=90\text{ °C}$			
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.	
<b>Characteristics</b>					
Thermal resistance, junction - case	$R_{thJC}$	-	-	0.8	K/W
Thermal resistance, junction - ambient, leaded	$R_{thJA}$	-	-	62	
SMD version, device on PCB: @ min. footprint @ 6 cm <sup>2</sup> cooling area <sup>1)</sup>	$R_{thJA}$	-	-	62	
		-	35	-	

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Static Characteristics</b>					
Reverse leakage current $V_R=600\text{V}$ , $T_j=25\text{ }^\circ\text{C}$ $V_R=600\text{V}$ , $T_j=150\text{ }^\circ\text{C}$	$I_R$	-	-	50 3000	$\mu\text{A}$
Forward voltage drop $I_F=45\text{A}$ , $T_j=25\text{ }^\circ\text{C}$ $I_F=45\text{A}$ , $T_j=150\text{ }^\circ\text{C}$	$V_F$	-	1.5 1.5	2 -	V

<sup>1</sup>Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70  $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical without blown air.

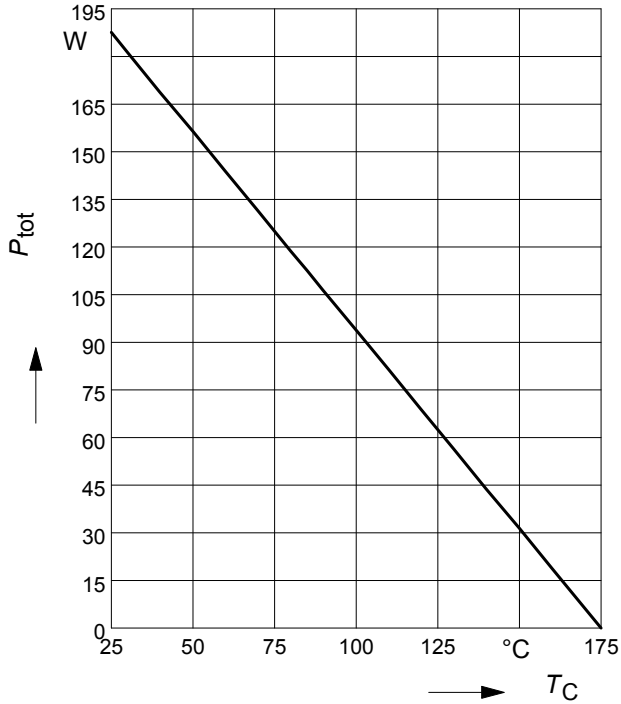
**Electrical Characteristics, at  $T_j = 25\text{ }^\circ\text{C}$ , unless otherwise specified**

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>Dynamic Characteristics</b>					
Reverse recovery time $V_R=400\text{V}$ , $I_F=45\text{A}$ , $di_F/dt=1000\text{A}/\mu\text{s}$ , $T_j=25^\circ\text{C}$ $V_R=400\text{V}$ , $I_F=45\text{A}$ , $di_F/dt=1000\text{A}/\mu\text{s}$ , $T_j=125^\circ\text{C}$ $V_R=400\text{V}$ , $I_F=45\text{A}$ , $di_F/dt=1000\text{A}/\mu\text{s}$ , $T_j=150^\circ\text{C}$	$t_{rr}$	- - -	140 185 195	- - -	ns
Peak reverse current $V_R=400\text{V}$ , $I_F = 45\text{A}$ , $di_F/dt=1000\text{A}/\mu\text{s}$ , $T_j=25^\circ\text{C}$ $V_R=400\text{V}$ , $I_F = 45\text{A}$ , $di_F/dt=1000\text{A}/\mu\text{s}$ , $T_j=125^\circ\text{C}$ $V_R=400\text{V}$ , $I_F = 45\text{A}$ , $di_F/dt=1000\text{A}/\mu\text{s}$ , $T_j=150^\circ\text{C}$	$I_{rrm}$	- - -	23 28.1 29	- - -	A
Reverse recovery charge $V_R=400\text{V}$ , $I_F=45\text{A}$ , $di_F/dt=1000\text{A}/\mu\text{s}$ , $T_j=25^\circ\text{C}$ $V_R=400\text{V}$ , $I_F = 45\text{A}$ , $di_F/dt=1000\text{A}/\mu\text{s}$ , $T_j=125^\circ\text{C}$ $V_R=400\text{V}$ , $I_F = 45\text{A}$ , $di_F/dt=1000\text{A}/\mu\text{s}$ , $T_j=150^\circ\text{C}$	$Q_{rr}$	- - -	1400 2650 2900	- - -	nC
Reverse recovery softness factor $V_R=400\text{V}$ , $I_F=45\text{A}$ , $di_F/dt=1000\text{A}/\mu\text{s}$ , $T_j=25^\circ\text{C}$ $V_R=400\text{V}$ , $I_F=45\text{A}$ , $di_F/dt=1000\text{A}/\mu\text{s}$ , $T_j=125^\circ\text{C}$ $V_R=400\text{V}$ , $I_F=45\text{A}$ , $di_F/dt=1000\text{A}/\mu\text{s}$ , $T_j=150^\circ\text{C}$	S	- - -	3.1 4.2 4.4	- - -	

**1 Power dissipation**

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

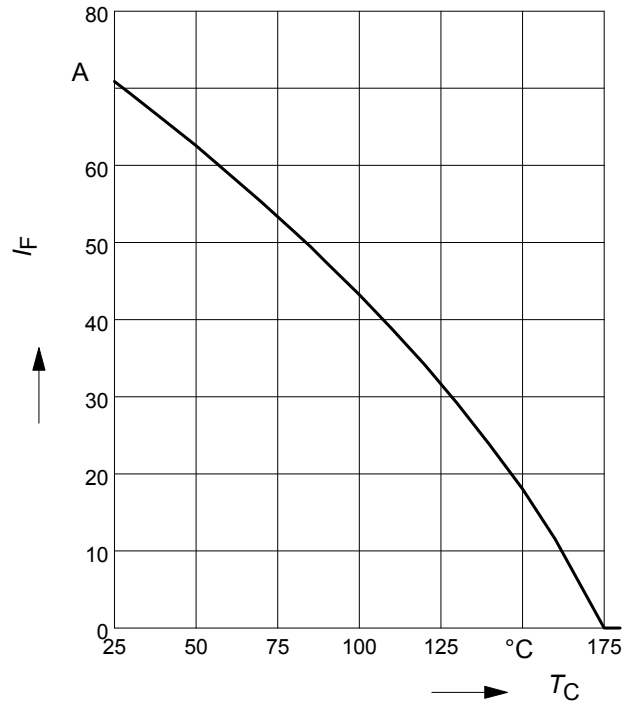
parameter:  $T_j \leq 175^\circ\text{C}$



**2 Diode forward current**

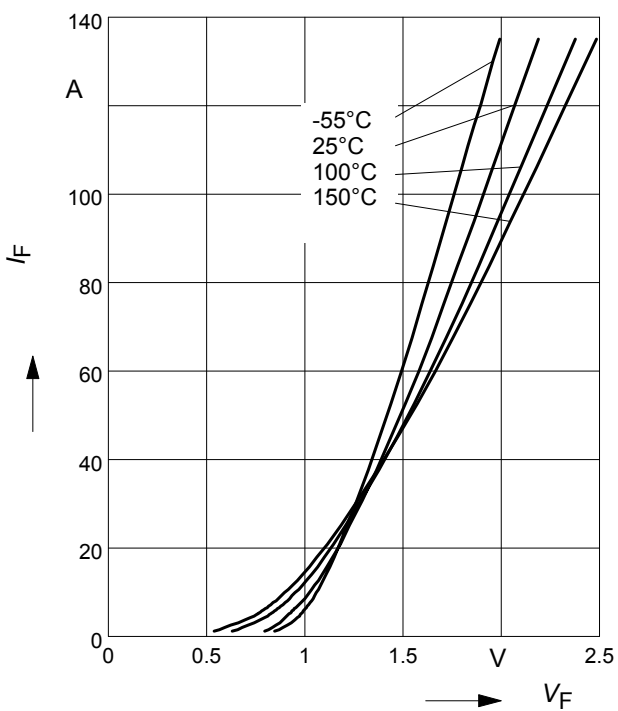
$$I_F = f(T_C)$$

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



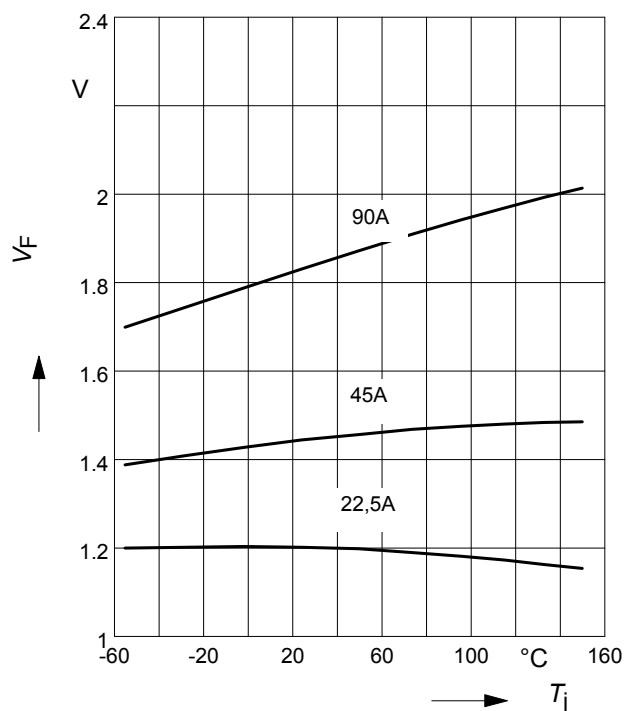
**3 Typ. diode forward current**

$$I_F = f(V_F)$$



**4 Typ. diode forward voltage**

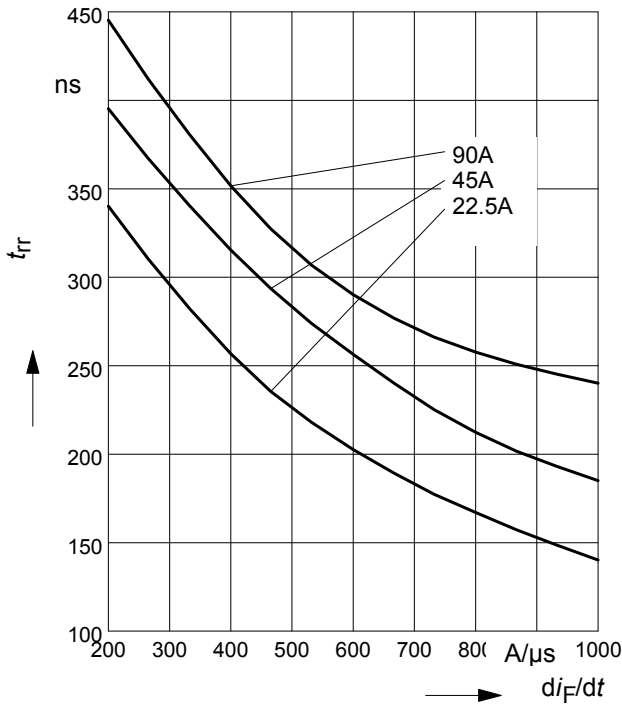
$$V_F = f(T_j)$$



**5 Typ. reverse recovery time**

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

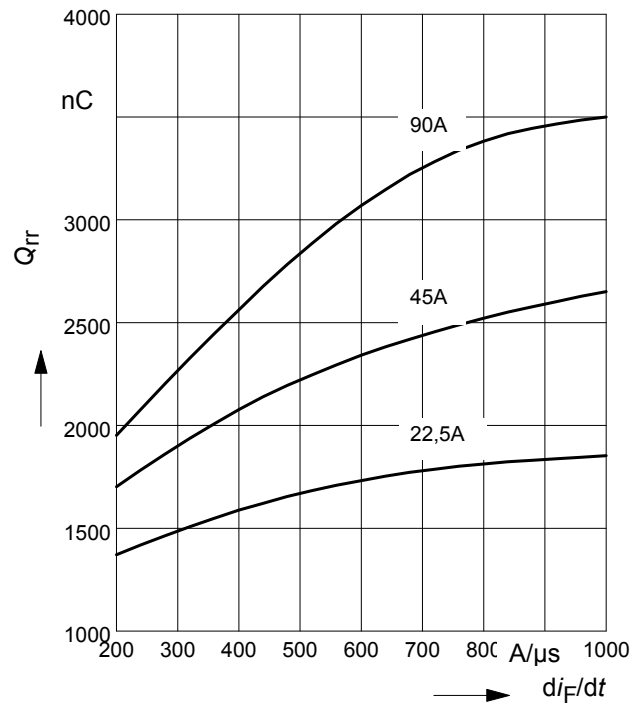
parameter:  $V_R = 400V, T_j = 125^\circ C$



**6 Typ. reverse recovery charge**

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

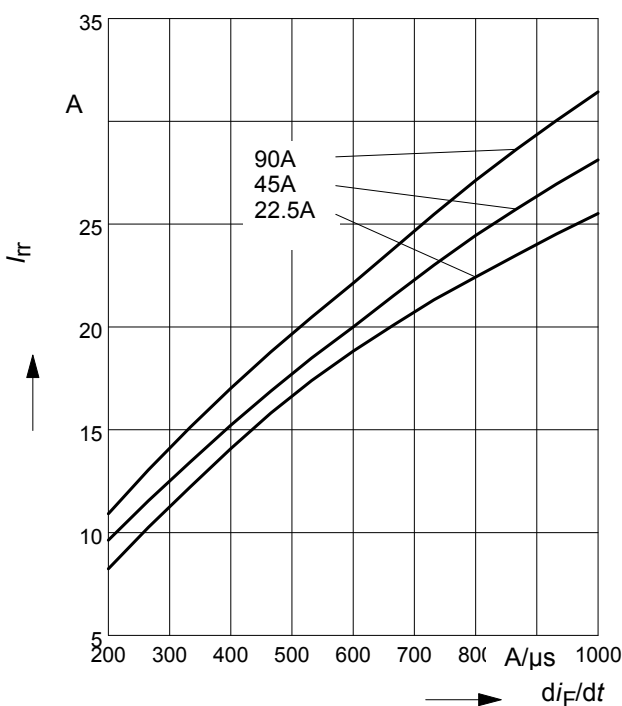
parameter:  $V_R = 400V, T_j = 125^\circ C$



**7 Typ. reverse recovery current**

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

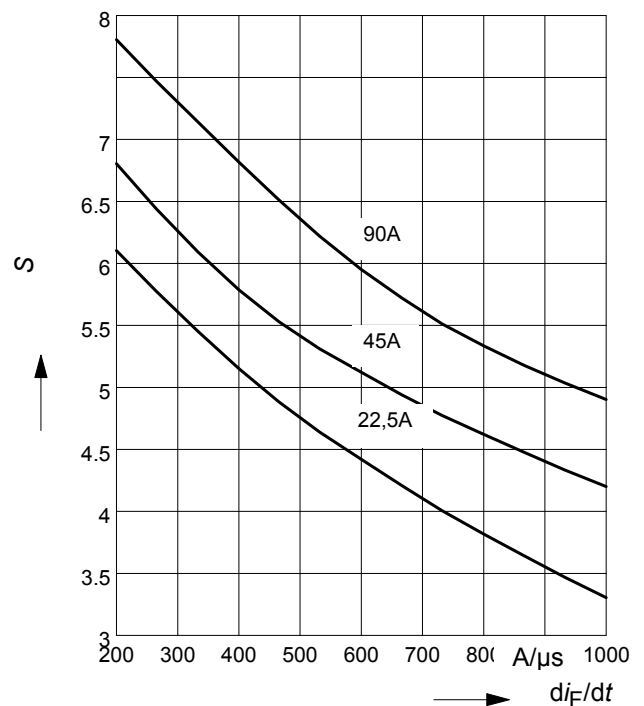
parameter:  $V_R = 400V, T_j = 125^\circ C$



**8 Typ. reverse recovery softness factor**

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

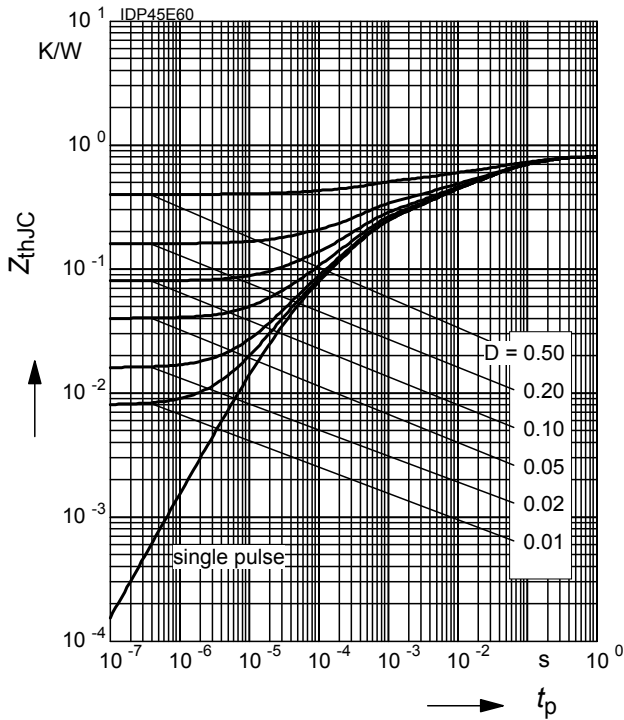
parameter:  $V_R = 400V, T_j = 125^\circ C$



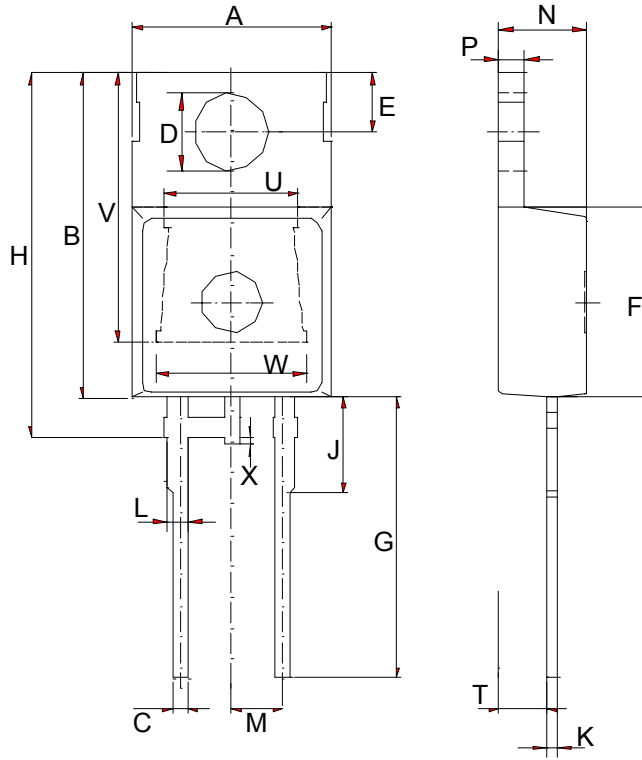
**9 Max. transient thermal impedance**

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

parameter :  $D = t_p/T$

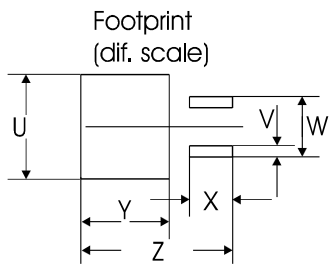
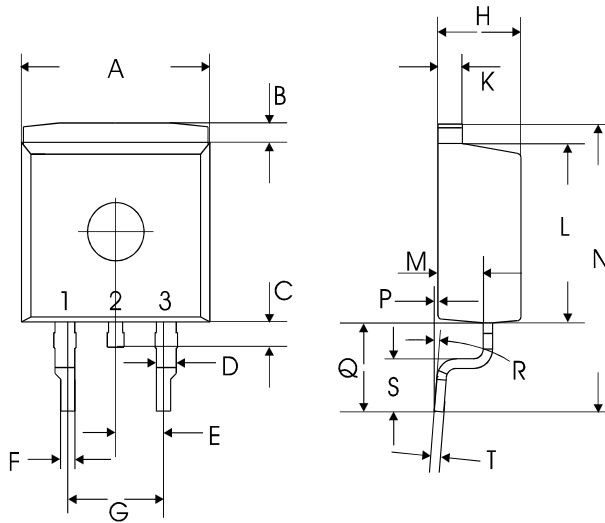


TO-220-2-2



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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