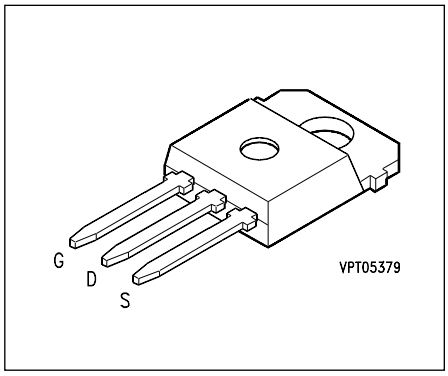
SIEMENS

SIPMOS® Power Transistor — BUZ 338

- N channel
- Enhancement mode
- Avalanche-rated



Type	V_{DS}	I_D	$R_{DS\ (on)}$	Package [1]	Ordering Code
BUZ 338	500 V	13.5 A	0.4 Ω	TO-218 AA	C67078-S3126-A2

Maximum Ratings

Parameter	Symbol	Values	Unit
Continuous drain current, T_C = 28 ˚C	I_D	**13.5**	A
Pulsed drain current, T_C = 25 ˚C	$I_{D\ puls}$	**54**	
Avalanche current, limited by $T_{j\ max}$	I_{AR}	**13.5**	
Avalanche energy, periodic limited by $T_{j\ (max)}$	E_{AR}	**18**	mJ
Avalanche energy, single pulse I_D = 13.5 A, V_{DD} = 50 V, R_{GS} = 25 Ω L = 9.09 mH, T_j = 25 ˚C	E_{AS}	**920**	
Gate-source voltage	V_{GS}	± **20**	V
Power dissipation, T_C = 25 ˚C	P_{tot}	**180**	W
Operating and storage temperature range	T_j , T_{stg}	**– 55 ... + 150**	˚C

Thermal resistance, chip-case	$R_{th\ JC}$	≤ **0.7**	K/W
DIN humidity category, DIN 40 040	–	**E**	–
IEC climatic category, DIN IEC 68-1	–	**55/150/56**	

1) See chapter Package Outlines.

Electrical Characteristics

at T_j = 25 ˚C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static characteristics					
Drain-source breakdown voltage V_{GS} = 0 V, I_D = 0.25 mA	$V_{(BR)\ DSS}$	500	–	–	V
Gate threshold voltage V_{GS} = V_{DS} , I_D = 1 mA	$V_{GS\ (th)}$	2.1	3.0	4.0	
Zero gate voltage drain current V_{DS} = 500 V, V_{GS} = 0 V T_j = 25 ˚C T_j = 125 ˚C	I_{DSS}	 – –	 0.1 100	 1.0 1000	µA
Gate-source leakage current V_{GS} = 20 V, V_{DS} = 0 V	I_{GSS}	–	10	100	nA
Drain-source on-resistance V_{GS} = 10 V, I_D = 8.5 A	$R_{DS\ (on)}$	–	0.3	0.4	Ω
Dynamic characteristics					
Forward transconductance $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$, I_D = 8.5 A	g_{fs}	8.0	15	–	S
Input capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{iss}	–	2500	3325	pF
Output capacitance V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	C_{oss}	–	320	480	
Reverse transfer capacitance V_{GS} = 0 V , V_{DS} = 25 V, f = 1 MHz	C_{rss}	–	120	180	
Turn-on time t_{on} , (t_{on} = $t_{d\ (on)}$ + t_r) V_{DD} = 30 V, V_{GS} = 10 V, I_D = 2.9 A, R_{GS} = 50 Ω	$t_{d\ (on)}$	–	40	60	ns
	t_r	–	100	150	
Turn-off *t*ime t_{off} , (t_{off} = $t_{d\ (off)}$ + t_f) V_{DD} = 30 V, V_{GS} = 10 V, I_D = 2.9 A, R_{GS} = 50 Ω	$t_{d\ (off)}$	–	450	600	
	t_f	–	120	160	

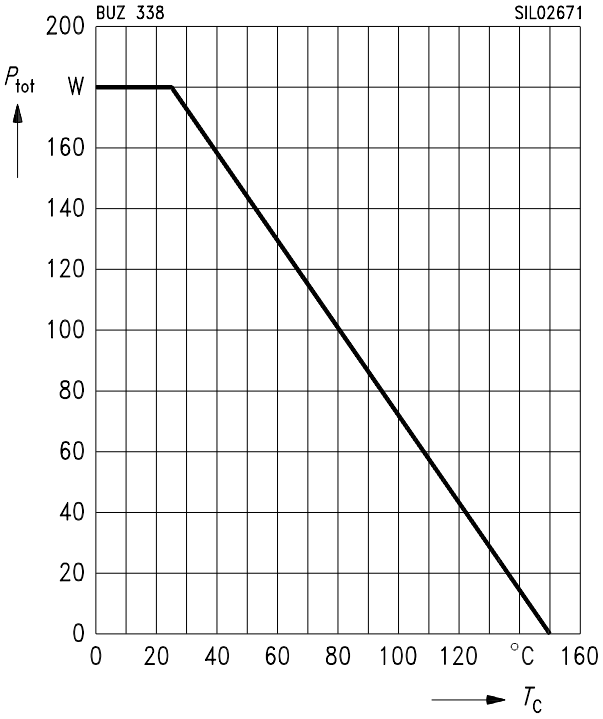
Electrical Characteristics (cont'd)
at T_j = 25 ˚C, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Reverse diode					
Continuous reverse drain current T_C = 25 ˚C	I_S	–	–	13.5	A
Pulsed reverse drain current T_C = 25 ˚C	I_{SM}	–	–	54	
Diode forward on-voltage I_S = 27 A, V_{GS} = 0 V	V_{SD}	–	1.1	1.6	V
Reverse recovery time V_R = 100 V, $I_F = I_S$, di_F / dt = 100 A/µs	t_{rr}	–	400	–	ns
Reverse recovery charge V_R = 100 V, $I_F = I_S$, di_F / dt = 100 A/µs	Q_{rr}	–	6.2	–	µC

Characteristics at T_j = 25 °C, unless otherwise specified.

Total power dissipation

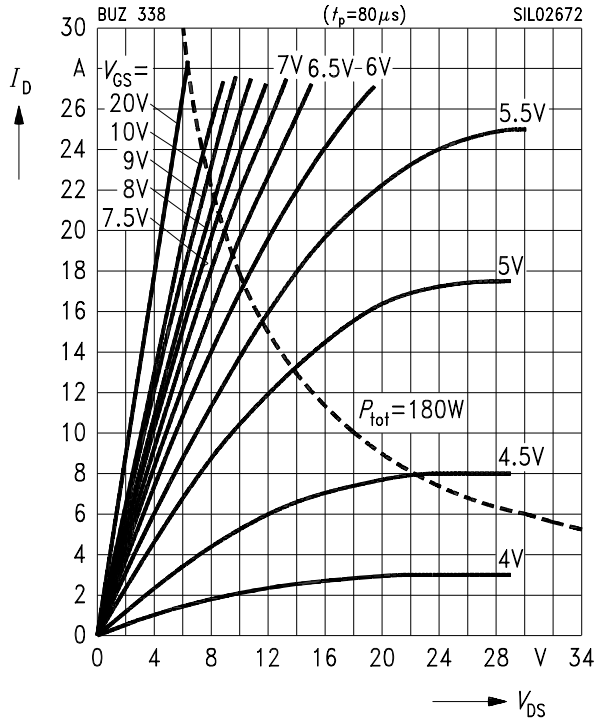
$P_{tot} = f(T_C)$



Typ. output characteristics

$I_D = f(V_{DS})$

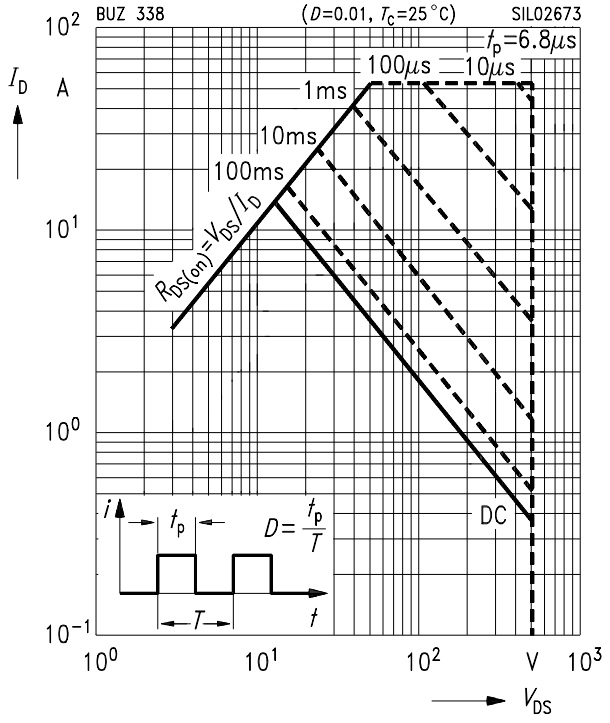
parameter: t_p = 80 µs



Safe operating area

$I_D = f(V_{DS})$

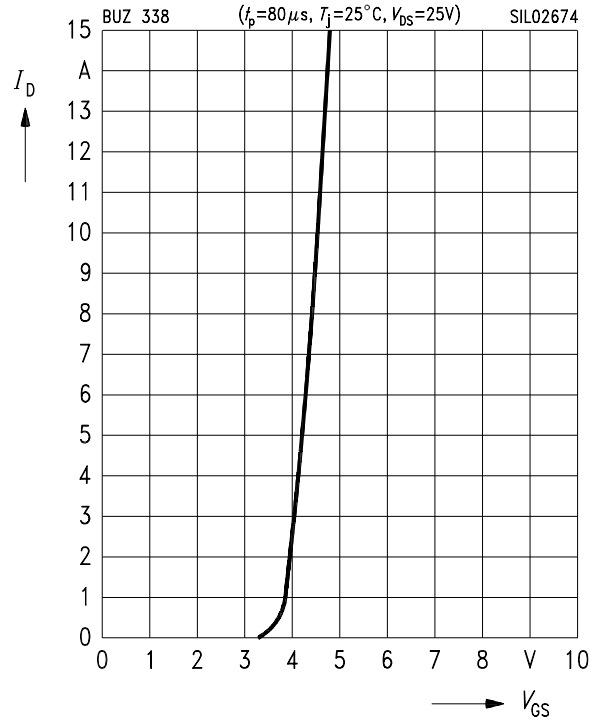
parameter: D = 0.01, T_C = 25 °C



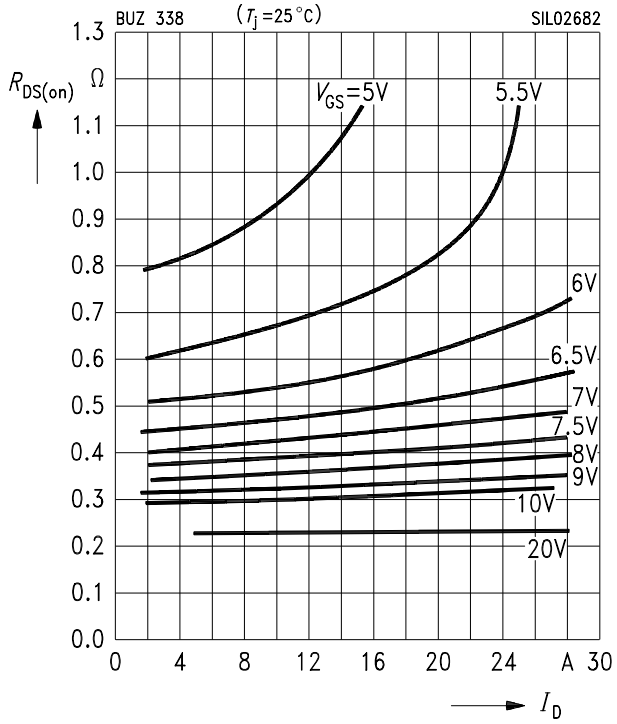
Typ. transfer characteristics

$I_D = f(V_{GS})$

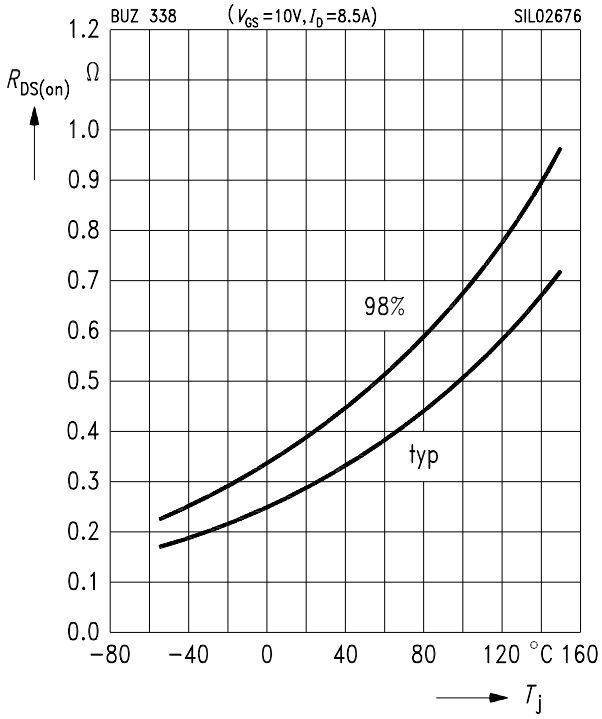
parameter: t_p = 80 µs, V_{DS} = 25 V



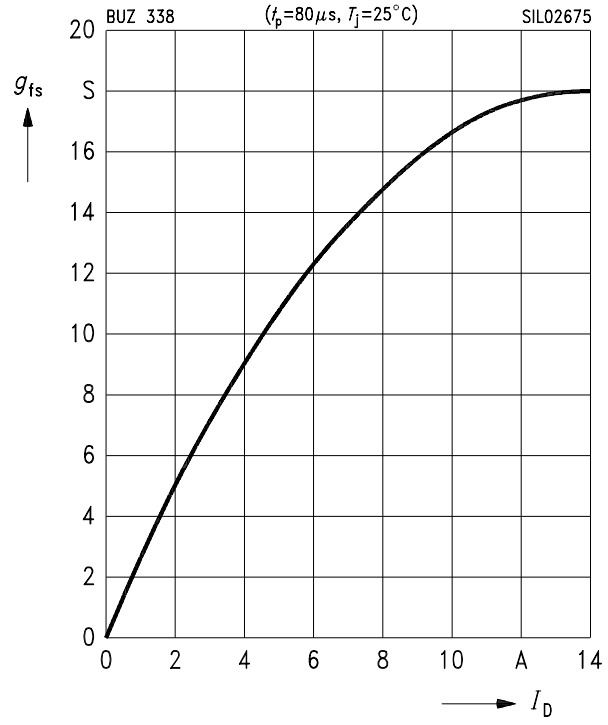
Typ. drain-source on-resistance
$R_{DS\ (on)} = f\ (I_D)$
parameter: V_{GS}



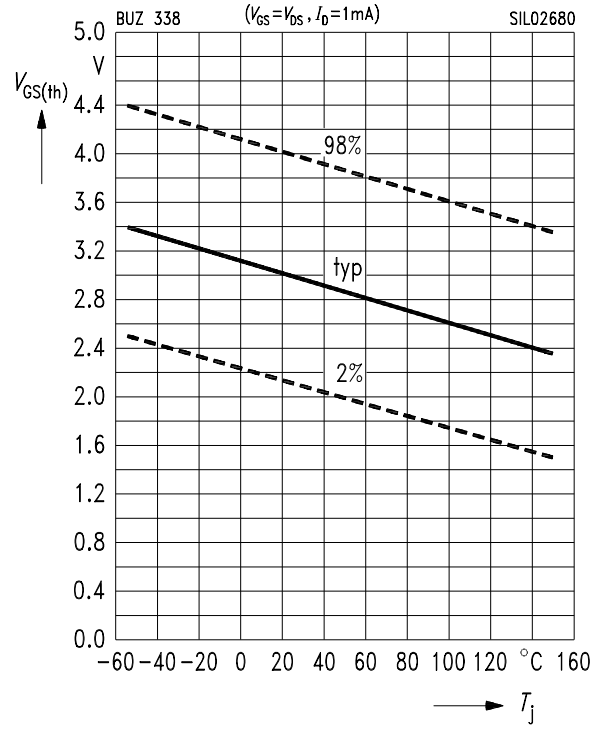
Drain-source on-resistance
$R_{DS\ (on)} = f\ (T_j)$
parameter: I_D = 8.5 A, V_{GS} = 10 V, (spread)



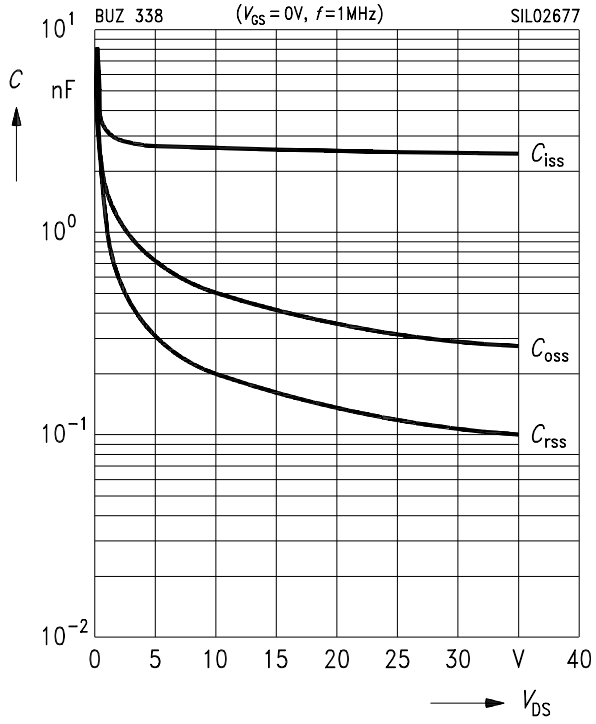
Typ.forward transconductance
$g_{fs} = f\ (I_D)$
parameter: t_p = 80 µs



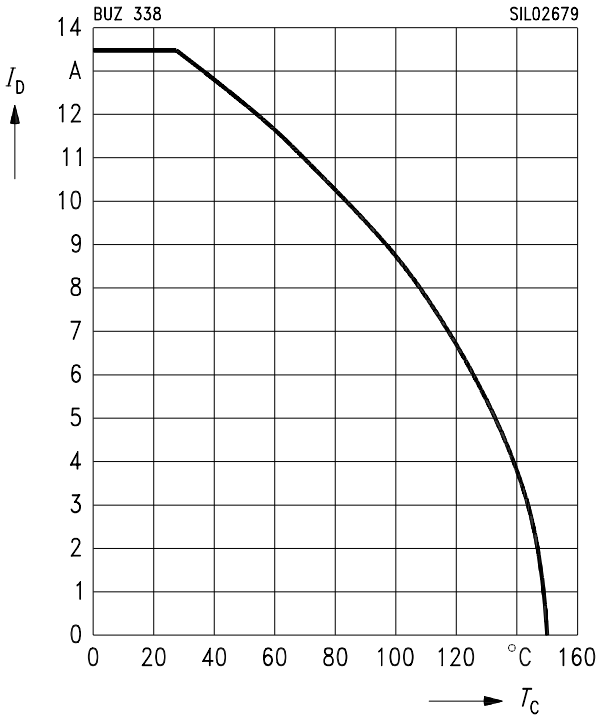
Gate threshold voltage
$V_{GS\ (th)} = f\ (T_j)$
parameter: $V_{GS} = V_{DS}$, I_D = 1 mA, (spread)



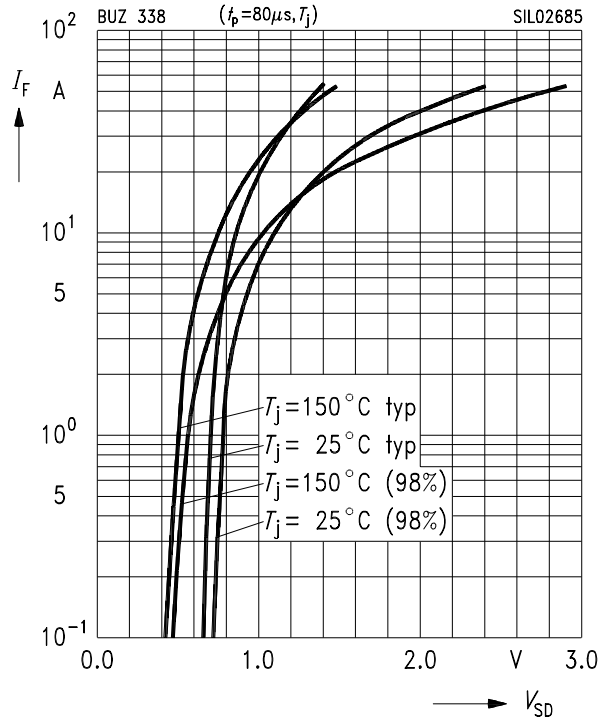
Typ. capacitances
$C = f(V_{DS})$
parameter: V_{GS} = 0 V, f = 1 MHz



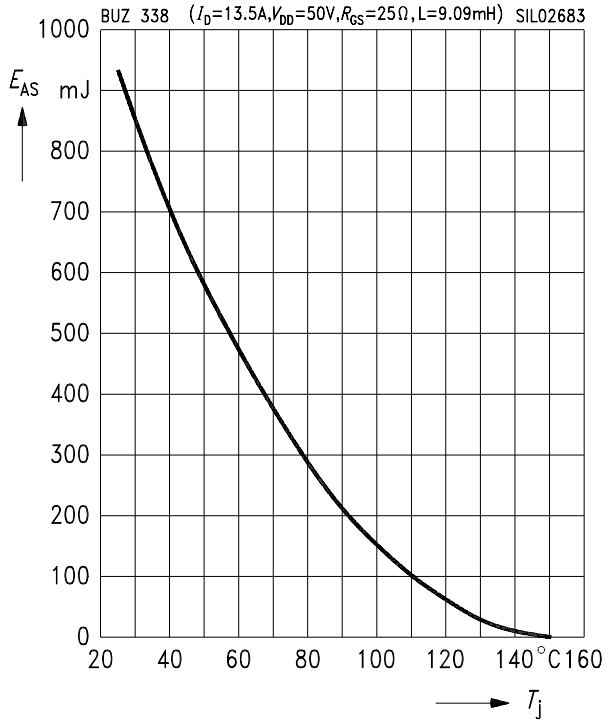
Drain current
$I_D = f(T_C)$)
parameter: $V_{GS} \geq 10$ V



Forward characteristics of reverse diode
$I_F = f(V_{SD})$
parameter: T_j , t_p = 80 µs



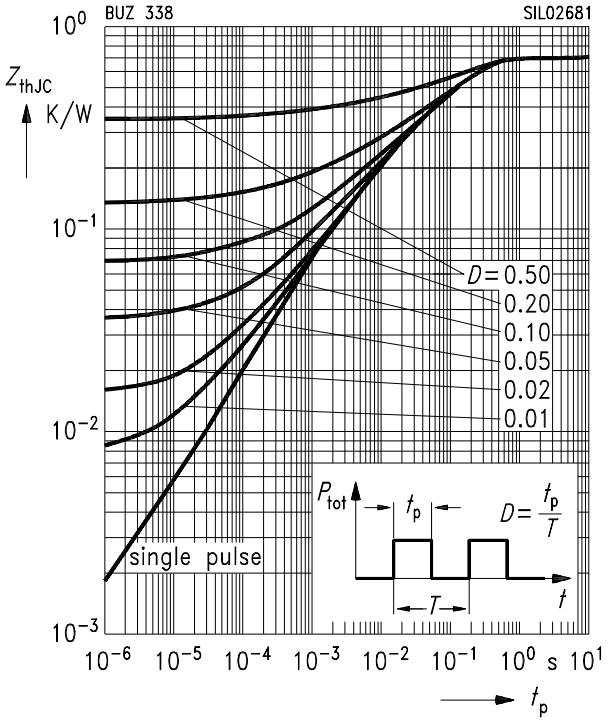
Avalanche energy $E_{AS} = f(T_j)$
parameter: I_D = 13.5 A, V_{DD} = 50 V
R_{GS} = 25 Ω, L = 9.09 mH



Transient thermal impedance

$Z_{th\,JC} = f(t_p)$

parameter: $D = t_p / T$



Typ. gate charge

$V_{GS} = f(Q_{Gate})$

parameter: $I_{D\,puls}$ = 20.3 A