General Description

It combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$.

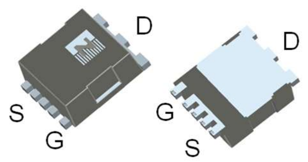
Features

- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Low thermal resistance
- AEC-Q101 qualified

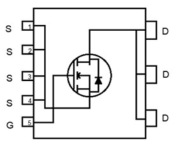
Application

- BLDC motor driver
- DC-DC
- Battery protection

Product Summary



sTOLL



V_{DS}=40V

$R_{DS(ON)}$ =0.75mR

I_D=320A

RoHS REACH HF

Ordering Information

Part NO.	ZMSA008N04HSR
Marking	ZMS008N04H
Packing information	REEL TAPE
Basic ordering unit (pcs)	2000

Absolute Maximum Ratings（T_A=25℃,unless otherwise specified）

Parameter	Symbol	Conditions	Min.	Max.	Unit
Drain-source voltage	V_{DS}		-	40	V
Gate-source voltage①	V_{GS}		-20	20	V
Continuous drain current	I_D	V_{GS}=10V, T_C=25℃	-	320	A
	I_D	V_{GS}=10V, T_C=75℃	-	275	A
	I_D	V_{GS}=10V, T_C=100℃	-	238	A
Pulsed drain current ①	I_{DM}	Pulsed; t_p ≤ 10 μs; T_C = 25 °C;	-	960	A
Total power dissipation	P_D	T_C=25℃	-	214	W
Total power dissipation	P_D	T_A=25℃	-	3	W
Operating junction temperature	T_J		-55	175	℃
Storage temperature	T_{STG}		-55	175	℃
Single pulse avalanche energy	E_{AS}	L=0.1mH, V_{GS}=10V, R_g=25Ω,	-	320	mJ
		L=0.5mH, V_{GS}=10V, R_g=25Ω,	-	672	mJ
ESD level (HBM)			CLASS 2		

●Thermal Resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	0.7	°C/W
Thermal resistance, junction - ambient②	R_{thJA}	-	-	50	°C/W
Soldering temperature(total time<10s)	T_{sold}	-	-	260	°C

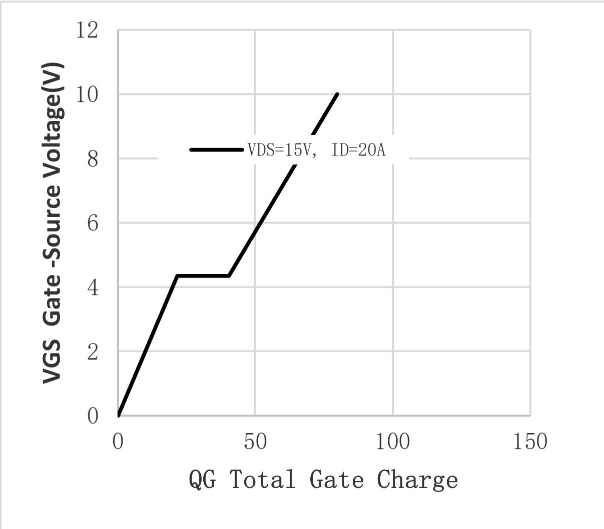
●Electronic Characteristics (T_j=25°C, unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain-source breakdown voltage	BV_{DSS}	V_{GS} =0V, I_D =250uA	40	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=250uA	2	2.7	3.5	V
Drain-source leakage current	I_{DSS}	V_{GS}=0V, V_{DS}=40V	-	-	1	uA
Gate- source leakage current	I_{GSS}	V_{GS}=±20V, V_{DS} =0V	-	-	100	nA
Static drain-source on resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=100A, T_j=25℃	-	0.75	0.9	mΩ
Forward transconductance	g_{FS}	V_{DS} =5V, I_{SD} = 10A	-	60	-	S
Diode forward voltage	V_{FSD}	V_{GS} =0V, I_{SD} = 100A	-	-	1.3	V

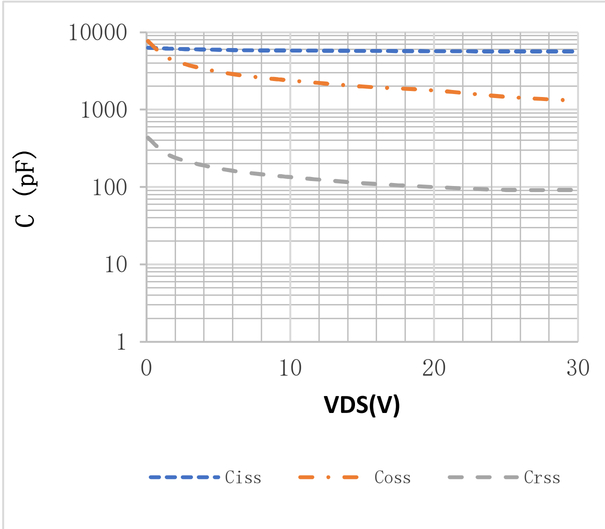
●Dynamic Characteristics (T_j=25°C, unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	f = 1MHz, V_{DS}=25V, V_{GS}=0V	-	5660	-	pF
Output capacitance	C_{oss}		-	1630	-	pF
Reverse transfer capacitance	C_{rss}		-	92	-	pF
Gate resistance	R_g	f = 1MHz	-	1.6	-	Ω
Total gate charge	Q_g	V_{DD} = 15V, I_D = 20A, V_{GS} = 10V	-	79.7	-	nC
Gate-source charge	Q_{gs}		-	21.6	-	nC
Gate-drain charge	Q_{gd}		-	18.8	-	nC
Turn-on delay time	$t_{D(on)}$	V_{GS}=10V, V_{DS}=15V, R_G =3.3Ω, I_D =20A	-	13	-	ns
Turn-on rise time	t_r		-	12	-	ns
Turn-off delay time	$t_{D(off)}$		-	27	-	ns
Turn-off fall time	t_f		-	16	-	ns
Reverse recovery time	t_{rr}	V_{DD}=20V, dI_S/dt = 100A/us, I_S=50A	-	64	-	ns
Reverse recovery charge	Q_{rr}		-	92	-	nC

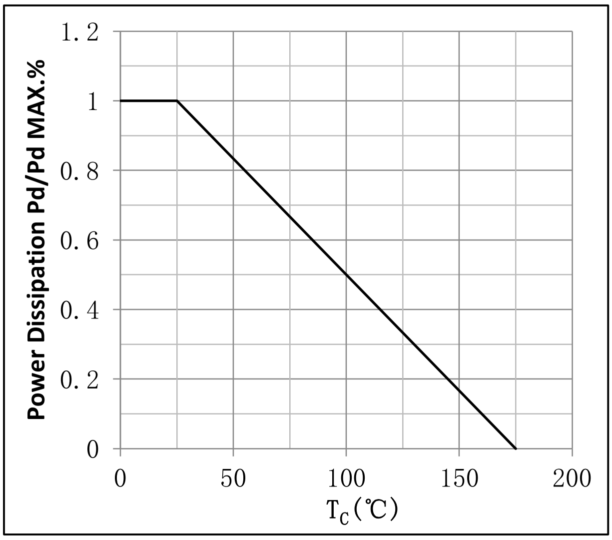
●Fig.1 Gate-source voltage as a function of gate charge; Typical values; T_j=25℃



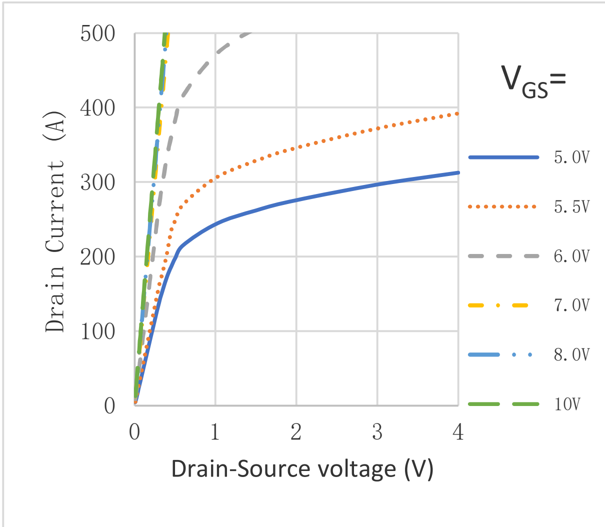
●Fig.2 Input, output and reverse transfer capacitances as a function of drain-source voltage; Typical values; T_j=25℃



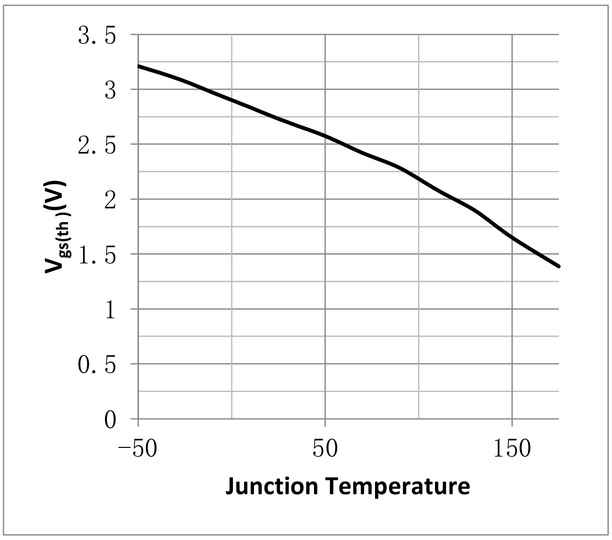
●Fig.3 Normalized total power dissipation as a function of case temperature; Calculative values Normalized Power Dissipation =P_d/P_d(25℃)



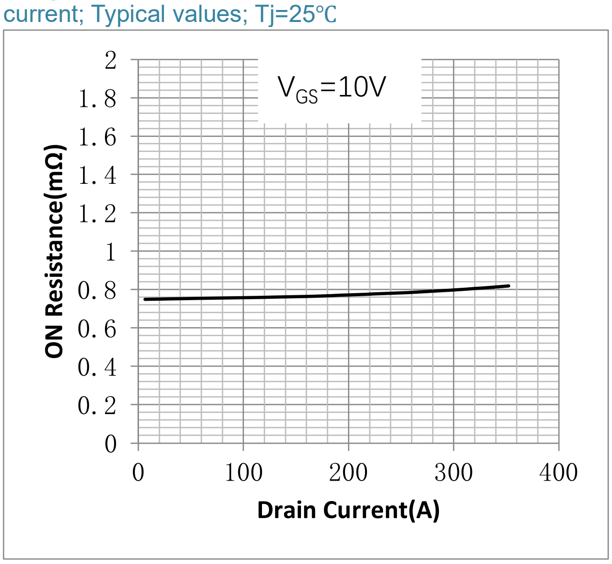
●Fig.4 Output characteristics: drain current as a function of drain-source voltage; Typical values: T_j=25℃



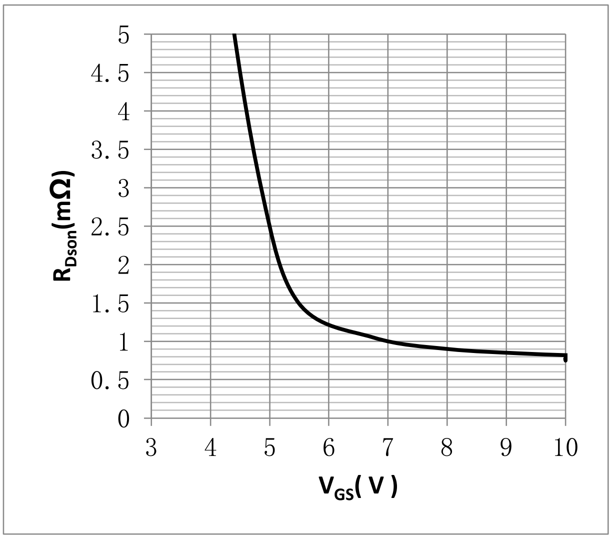
●Fig.5 Gate-source threshold voltage as a function of junction temperature; Typical values



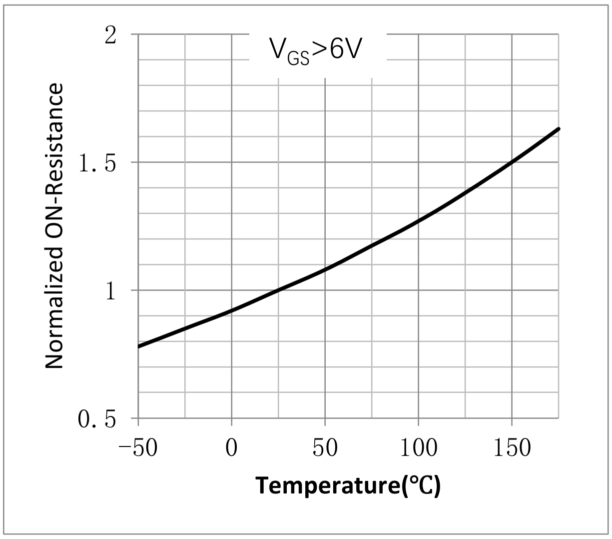
●Fig.6 Drain-source on-state resistance as a function of drain current; Typical values; Tj=25℃



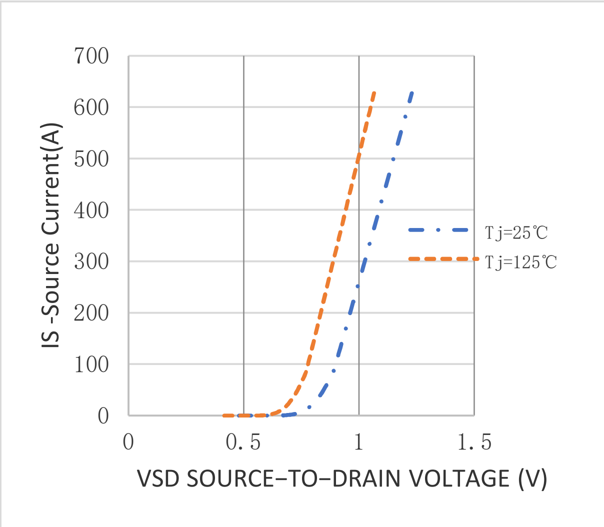
●Fig.7 Drain-source on-state resistance as a function of gate-source voltage; Typical values



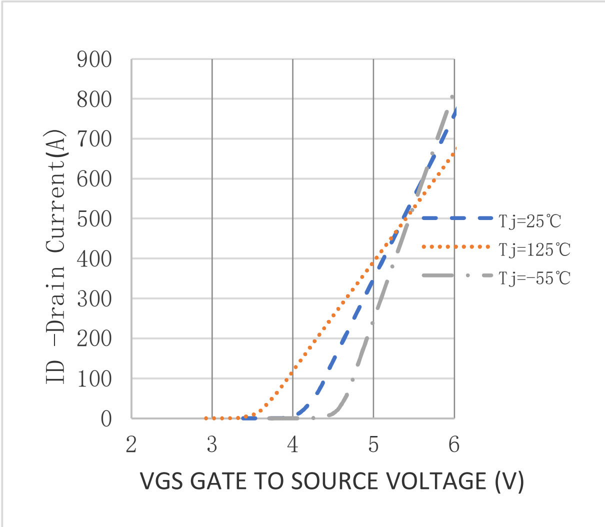
●Fig.8 Normalized drain-source on-state resistance factor as a function of junction temperature; Typical values Normalized On-Resistance=$R_{DSon}/R_{DSon}(25℃)$



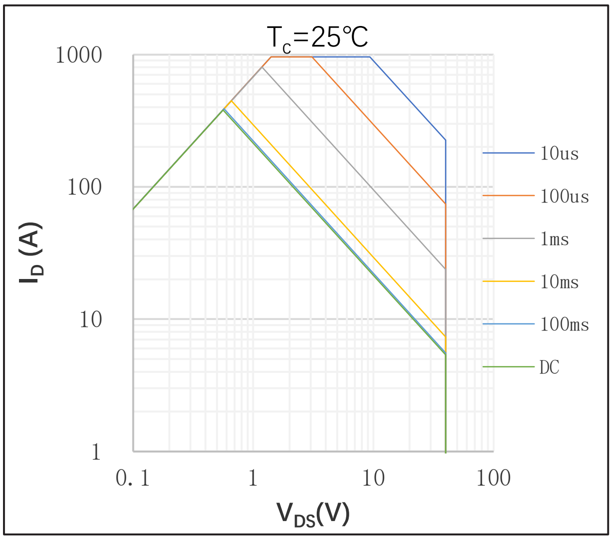
●Figure 9. Source (diode forward) current as a function of source-drain (diode forward) voltage; Typical values



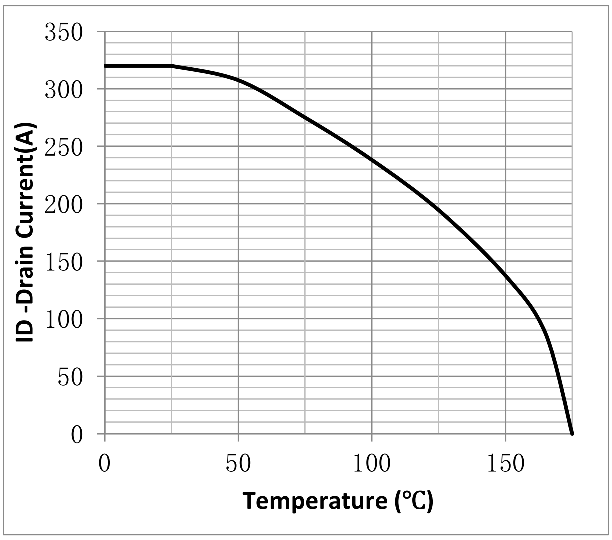
●Figure 10. Transfer characteristics: drain current as a function of gate-source voltage; Typical values



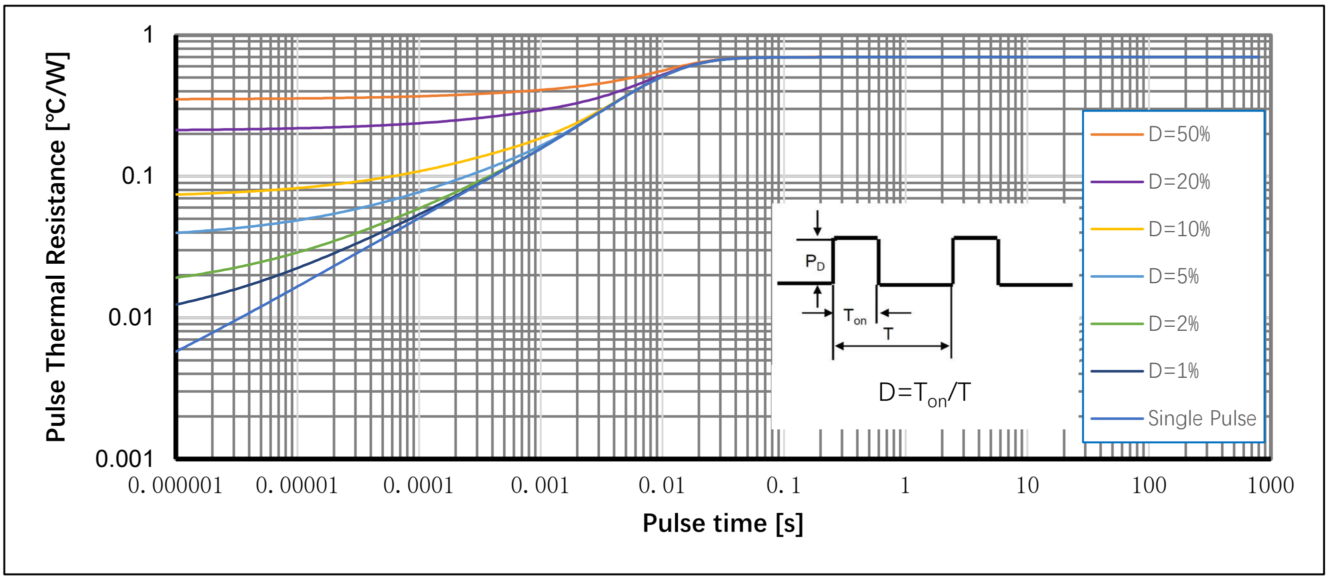
●Fig.11 Safe operating area: continuous and peak drain currents as a function of drain-source voltage; Calculative values



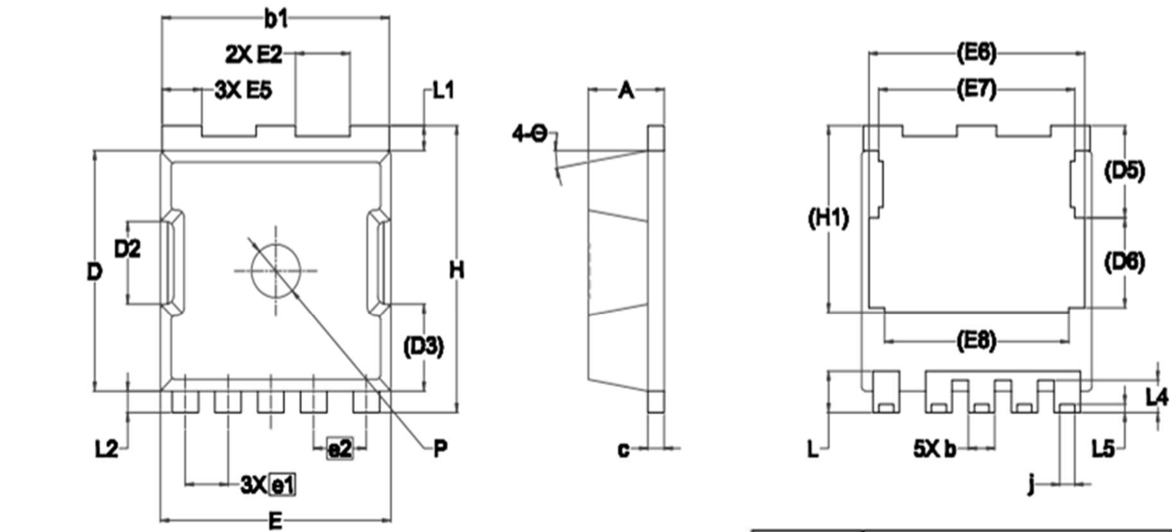
●Fig.12 Continuous drain current as a function of case temperature[3] ;Calculative values



●Fig.13 Transient thermal impedance from junction to case as a function of pulse duration; max values



Package Outline



SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	2.20	2.30	2.40
b	0.70	0.80	0.90
b1	6.80	6.90	7.00
c	0.40	0.50	0.60
D	6.60	6.70	6.80
D2	2.20	2.30	2.40
D3	2.43REF.		
D5	2.57REF.		
D6	2.50REF.		
E	6.90	7.00	7.10
E2	1.55	1.65	1.75
E5	1.10	1.20	1.30
E6	6.56REF.		
E7	5.96REF.		
E8	5.60REF.		
e1	1.20	1.30	1.40
e2	1.50	1.60	1.70
H	7.80	8.00	8.20
H1	5.20REF.		
L	1.05	1.15	1.25
L1	0.60	0.70	0.80
L2	0.50	0.60	0.70
L4	0.80	0.90	1.00
L5	0.135	0.235	0.335
j	0.42	0.45	0.50
p	1.40	1.50	1.60
θ	8.50°	—	11.50°

●Note

① Pulse : V_{GS}=+20V/-20V, Duty cycle=50%,T_j=175℃, t=1000 hours; For DC ， the following test conditions can be passed: V_{GS}=+20V/-10V, T_j=175℃, t=1000 hours；

②Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate；

③Practically the current will be limited by PCB, thermal design and operating temperature. V_{GS}=10V.

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Revision History

Version	Date	Change
A	2023/11/20	New
B	2024/5/20	Modified Rdson up limit
C	2025/12/15	1.Apply new datasheet format 2.Add transient thermal impedance curve. 3.Modify Qg,SOA. 4. Tighten VTH upper limit.