

Description

The HSH190N03 is the high cell density trenched N-ch MOSFETs, which provide excellent R_{DS(on)} and gate charge for most of the synchronous buck converter applications.

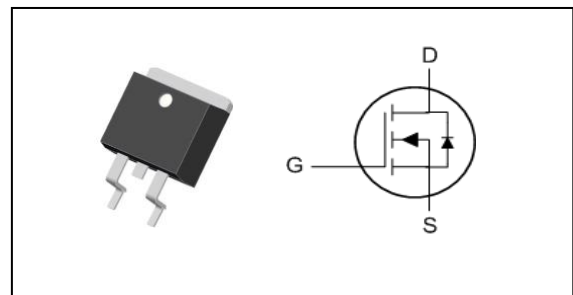
The HSH190N03 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

- 100% EAS Guaranteed
- Green Device Available
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology

Product Summary

V _{DS}	30	V
R _{DS(ON),typ}	1.9	mΩ
I _D	190	A

TO263 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V _{DS}	Drain-Source Voltage	30	V
V _{GS}	Gate-Source Voltage	±20	V
I _D @T _C =25°C	Continuous Drain Current, V _{GS} @ 10V _{1,6}	190	A
I _D @T _C =100°C	Continuous Drain Current, V _{GS} @ 10V _{1,6}	120	A
I _{DM}	Pulsed Drain Current ₂	720	A
EAS	Single Pulse Avalanche Energy ₃	440	mJ
I _{AS}	Avalanche Current	42	A
P _D @T _C =25°C	Total Power Dissipation ₄	180	W
T _{STG}	Storage Temperature Range	-55 to 175	°C
T _J	Operating Junction Temperature Range	-55 to 175	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R _{θJA}	Thermal Resistance Junction-Ambient ₁	---	62	°C/W
R _{θJC}	Thermal Resistance Junction-Case ₁	---	0.85	°C/W

N-Ch 30V Fast Switching MOSFETs
Electrical Characteristics (T_J=25 °C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	30	---	---	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C, I _D =1mA	---	0.014	---	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ₂	V _{GS} =10V, I _D =40A	---	1.9	2.4	mΩ
		V _{GS} =4.5V, I _D =30A	---	3	4.2	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.0	---	2.5	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	-4	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =24V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =24V, V _{GS} =0V, T _J =55°C	---	---	5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
Q _g	Total Gate Charge (4.5V)	V _{DS} =15V, V _{GS} =4.5V, I _D =30A	---	94	---	nC
Q _{gs}	Gate-Source Charge		---	19	---	
Q _{gd}	Gate-Drain Charge		---	22	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =15V, V _{GS} =10V, R _G =3.3Ω, I _D =30A	---	20	---	ns
T _r	Rise Time		---	9	---	
T _{d(off)}	Turn-Off Delay Time		---	66	---	
T _f	Fall Time		---	19	---	
C _{iss}	Input Capacitance	V _{DS} =15V, V _{GS} =0V, f=1MHz	---	6900	---	pF
C _{oss}	Output Capacitance		---	940	---	
C _{rss}	Reverse Transfer Capacitance		---	619	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
T _{rr}	Reverse Recovery Time	I _S =40A, V _{GS} =0V, di/dt=100A/us	---	29	---	ns
Q _{rr}	Reverse Recovery Charge		---	18	---	nC
V _{SD}	Diode Forward Voltage ₂	V _{GS} =0V, I _S =40A, T _J =25°C	---	---	1.2	V

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3.The EAS data shows Max. rating . The test condition is V_{DD}=15V, V_{GS}=10V, L=0.5mH, R_G=25R, I_{AS}=42A
- 4.The power dissipation is limited by 175°C junction temperature
- 5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.
- 6.Package limitation current is 120A.



Typical Characteristics

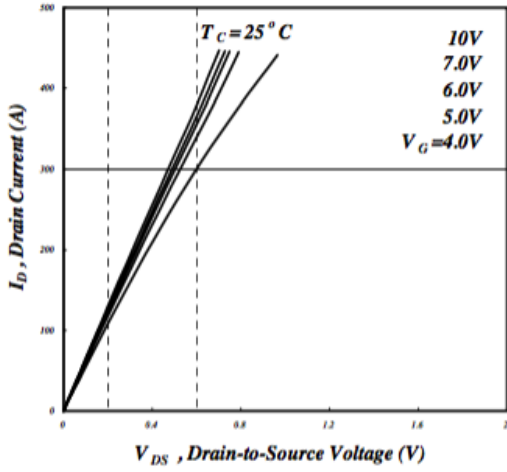


Fig 1. Typical Output Characteristics

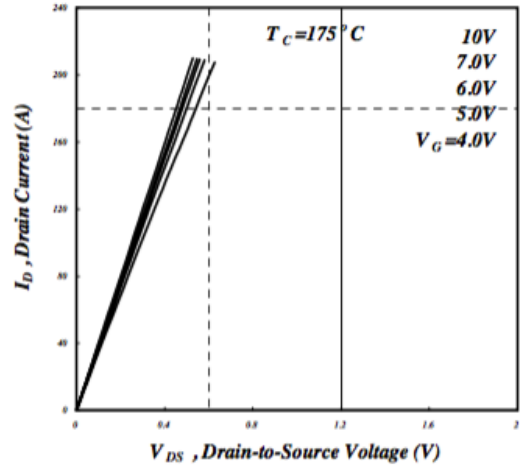


Fig 2. Typical Output Characteristics

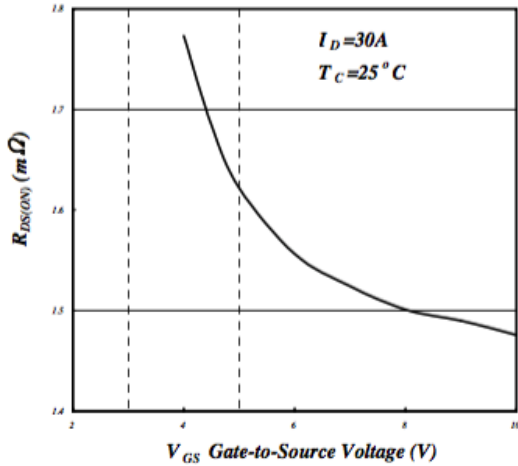


Fig 3. On-Resistance v.s. Gate Voltage

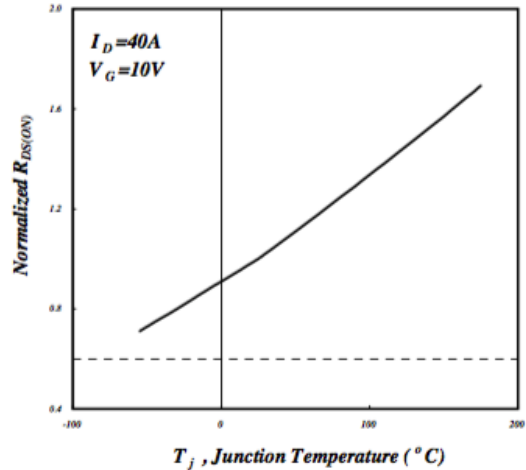


Fig 4. Normalized On-Resistance v.s. Junction Temperature

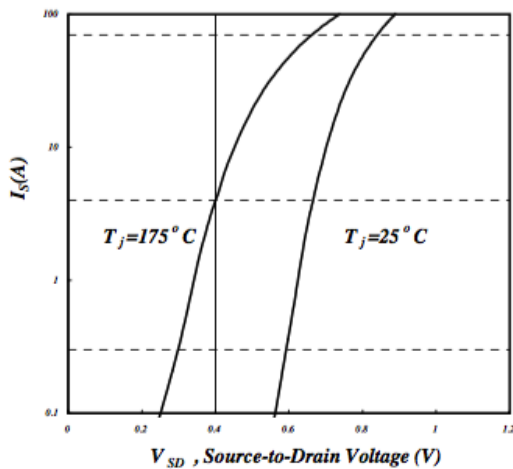


Fig 5. Forward Characteristic of Reverse Diode

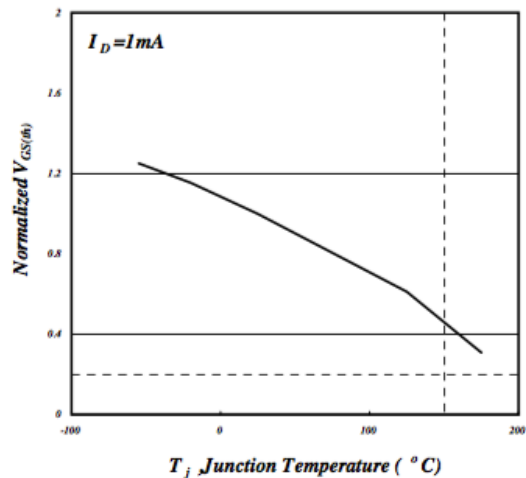


Fig 6. Gate Threshold Voltage v.s. Junction Temperature



N-Ch 30V Fast Switching MOSFETs

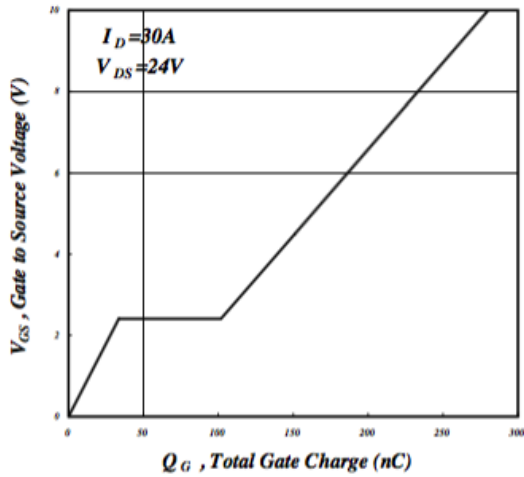


Fig 7. Gate Charge Characteristics

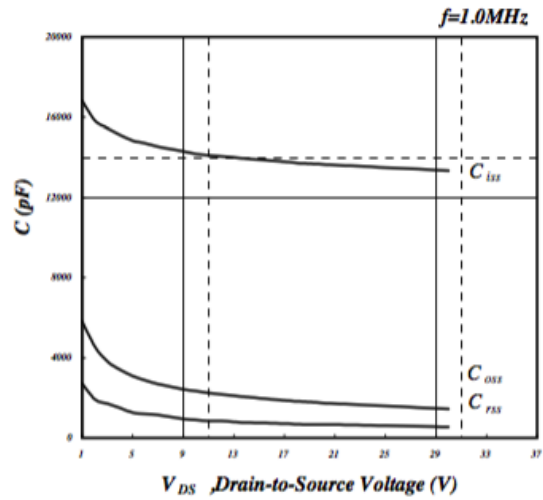


Fig 8. Typical Capacitance Characteristics

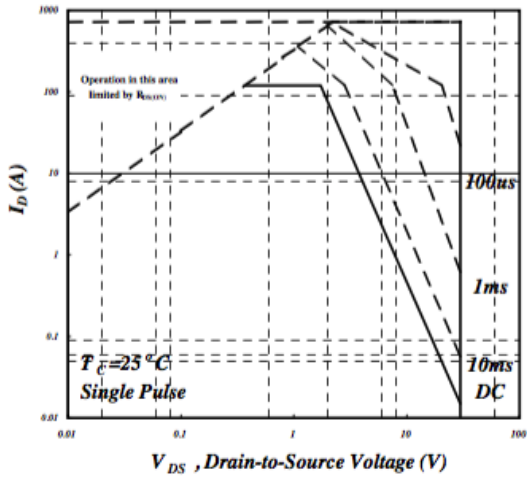


Fig 9. Maximum Safe Operating Area

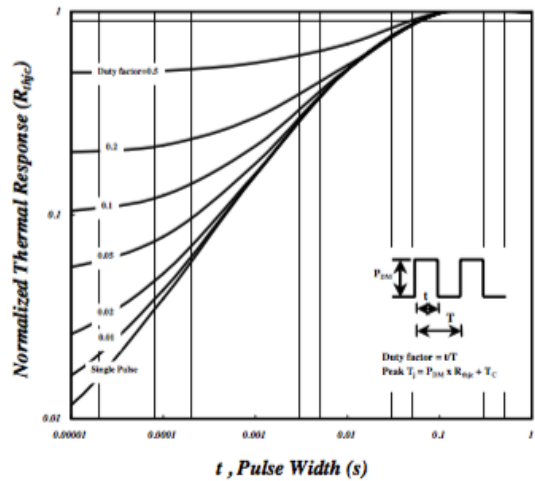


Fig 10. Effective Transient Thermal Impedance

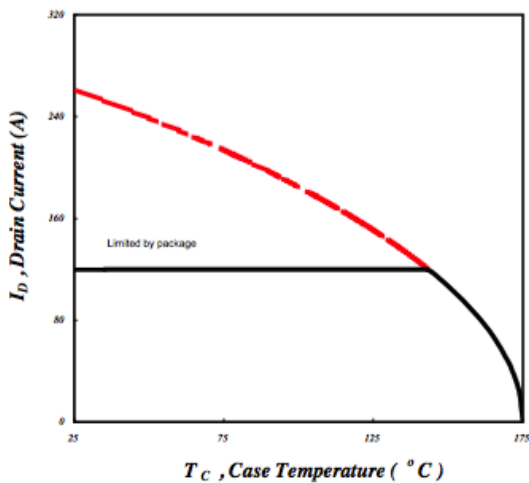


Fig 11. Drain Current v.s. Case Temperature

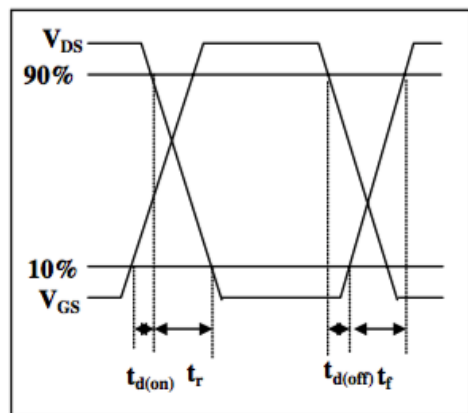


Fig 12. Switching Time Waveform



N-Ch 30V Fast Switching MOSFETs

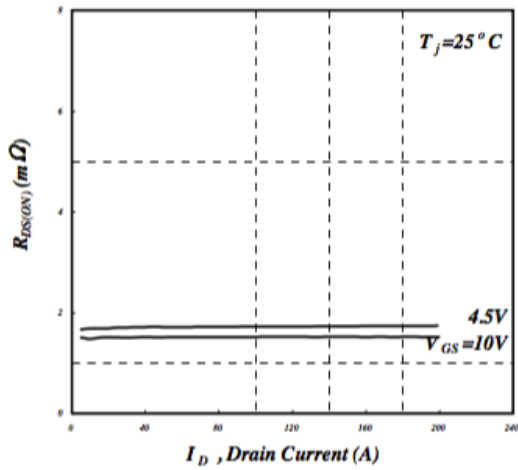


Fig 13. Typ. Drain-Source on State Resistance

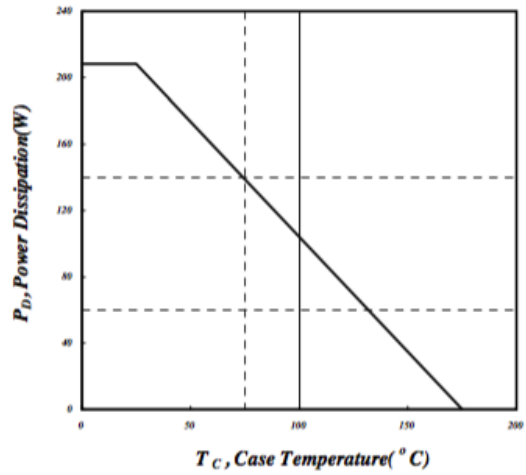


Fig 14. Total Power Dissipation

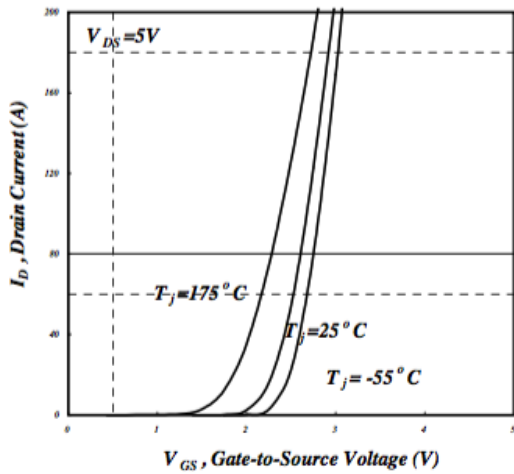
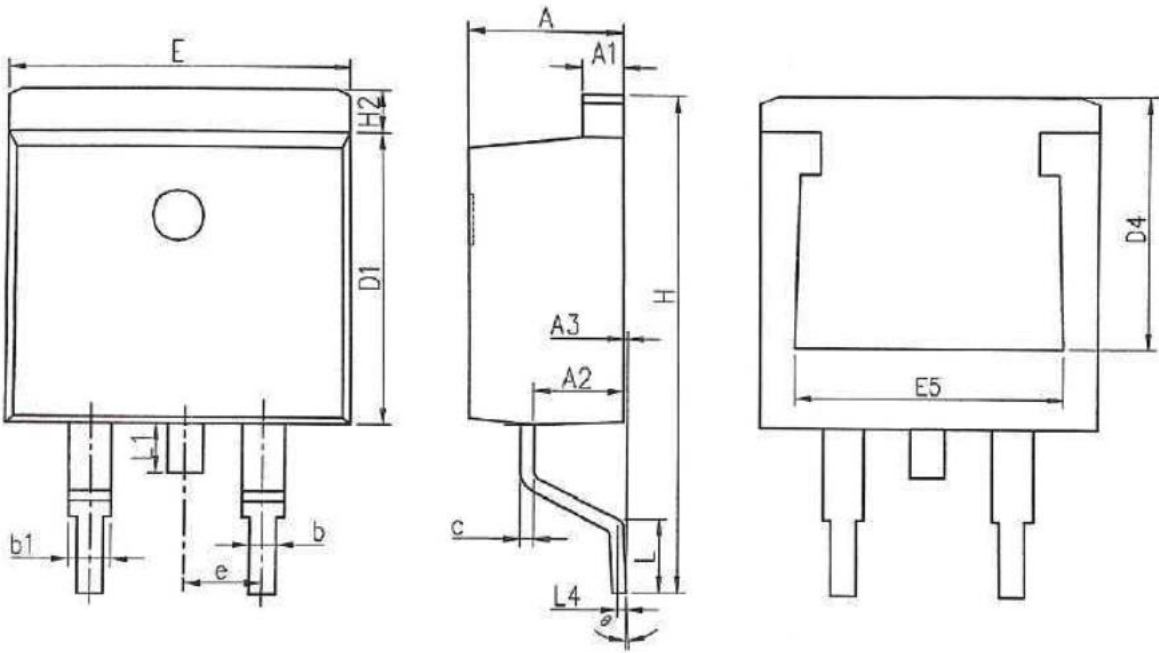


Fig 15. Transfer Characteristics



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.370	4.770	0.172	0.188
A1	1.220	1.420	0.048	0.056
A2	2.200	2.890	0.087	0.114
A3	0.000	0.250	0.000	0.010
b	0.700	0.960	0.028	0.038
b1	1.170	1.470	0.046	0.058
c	0.300	0.530	0.012	0.021
D1	8.500	9.300	0.335	0.366
D4	6.600	-	0.260	-
E	9.860	10.36	0.388	0.408
E5	7.060	-	0.278	-
e	2.540 BSC		0.100 BSC	
H	14.70	15.70	0.579	0.618
H2	1.070	1.470	0.042	0.058
L	2.000	2.600	0.079	0.102
L1	1.400	1.750	0.055	0.069
L4	0.250 BSC		0.010 BSC	
Θ	0°	9°	0°	9°