

General Description

The HSP4119 is the high cell density trenched P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The HSP4119 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

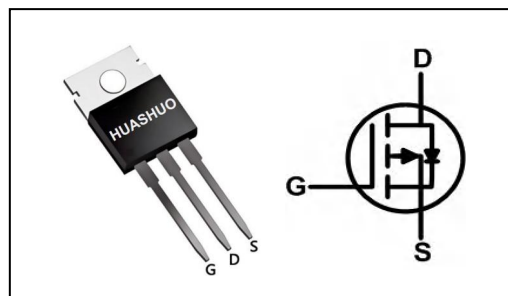
Features

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

Product Summary

V_{DS}	-40	V
$R_{DS(ON),typ}$	3.9	m Ω
I_D	-150	A

TO-220 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-40	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^{1,6}$	-150	A
$I_D@T_C=100^\circ C$	Continuous Drain Current, $V_{GS} @ -10V^{1,6}$	-103	A
I_{DM}	Pulsed Drain Current ²	-580	A
EAS	Single Pulse Avalanche Energy ³	1250	mJ
I_{AS}	Avalanche Current	-70	A
$P_D@T_C=25^\circ C$	Total Power Dissipation ⁴	200	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient ¹ (Steady State)	---	62	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-case ¹	---	0.95	$^\circ C/W$

Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-40	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=-10V, I_D=-30A$	---	3.9	4.5	$m\Omega$
		$V_{GS}=-4.5V, I_D=-20A$	---	4.9	5.6	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.0	-1.7	-2.5	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-40V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	-1	μA
		$V_{DS}=-40V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	-100	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
R_g	Gate resistance	$V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$		1.7		Ω
Q_g	Total Gate Charge (-10V)	$V_{DS}=-20V, V_{GS}=-10V, I_D=-20A$	---	190	---	nC
Q_{gs}	Gate-Source Charge		---	24	---	
Q_{gd}	Gate-Drain Charge		---	38	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=-20V, V_{GS}=-10V, R_G=3\Omega, I_D=-10A$	---	18	---	ns
T_r	Rise Time		---	3.6	---	
$T_{d(off)}$	Turn-Off Delay Time		---	21	---	
T_f	Fall Time		---	39	---	
C_{iss}	Input Capacitance	$V_{DS}=-20V, V_{GS}=0V, f=1\text{MHz}$	---	10700	---	pF
C_{oss}	Output Capacitance		---	780	---	
C_{rss}	Reverse Transfer Capacitance		---	660	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current ^{1,5}	$V_G=V_D=0V$, Force Current	---	---	-150	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V, I_S=-20A, T_J=25^\circ\text{C}$	---	---	-1.2	V
t_{rr}	Reverse Recovery Time	$I_F=-20A, di/dt=100A/\mu s, T_J=25^\circ\text{C}$	---	52	---	nS
Q_{rr}	Reverse Recovery Charge		---	128	---	nC

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 $\leq 300\mu s$, duty cycle $\leq 2\%$

3.The EAS data shows Max. rating . The test condition is $V_{DD}=-40V, V_{GS}=-10V, L=0.5mH, I_{AS}=-70A$

4.The power dissipation is limited by 150°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.The maximum current rating is package limited.

Typical Characteristics

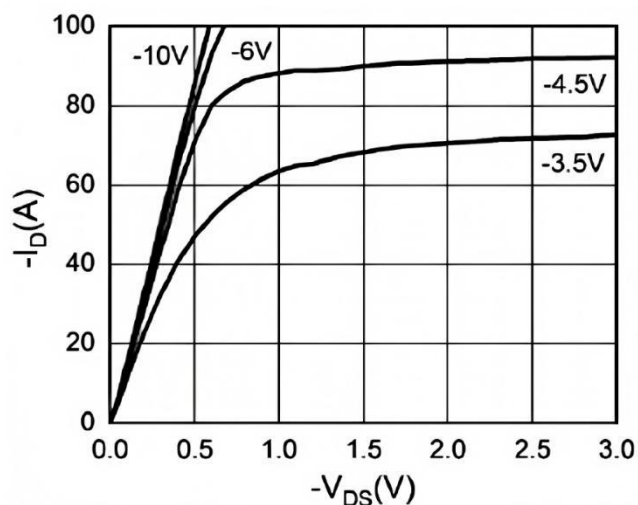


Fig.1 Output Characteristics

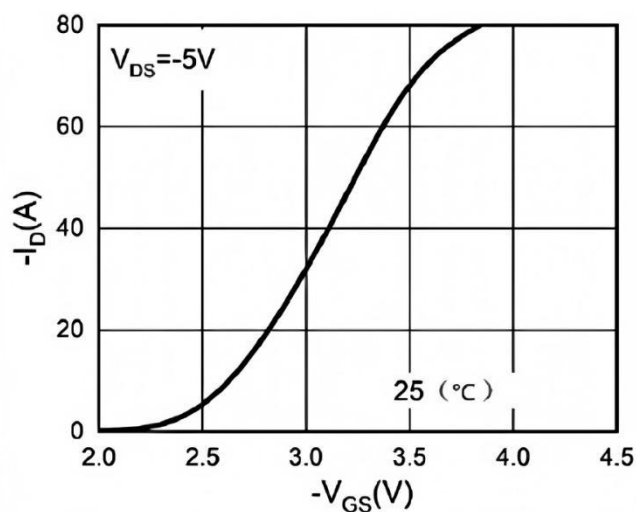


Fig.2 Transfer Characteristics

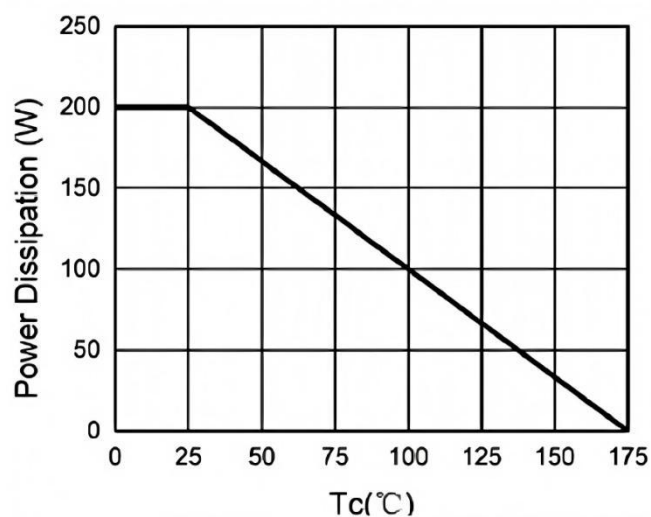


Fig.3 Power Dissipation

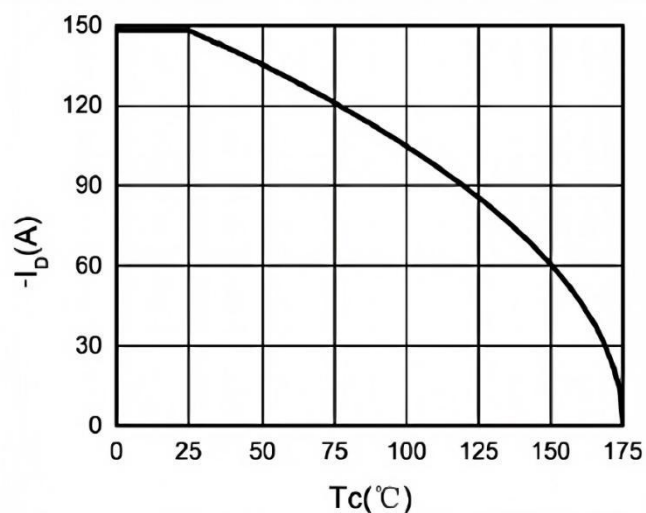


Fig.4 Drain Current

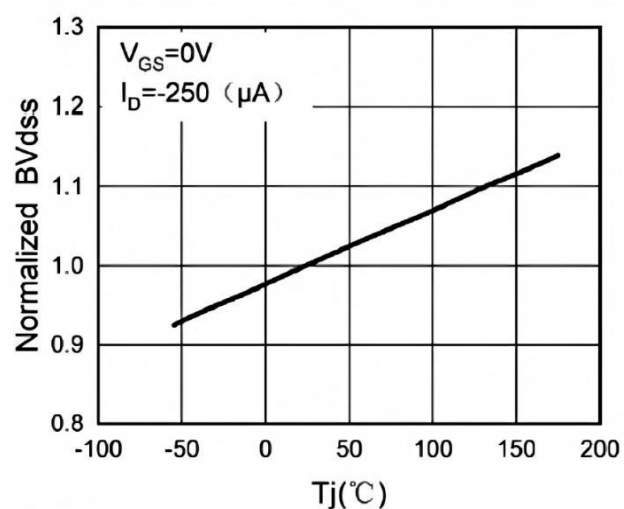


Fig.5 BV_{dss} vs Junction Temperature

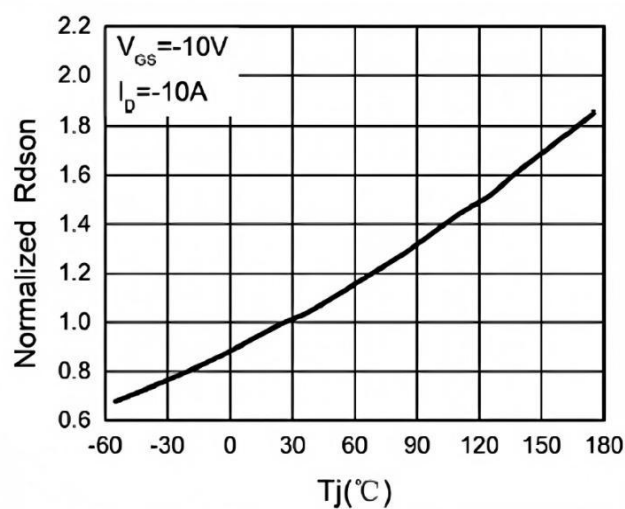


Fig.6 $R_{ds(on)}$ vs Junction Temperature

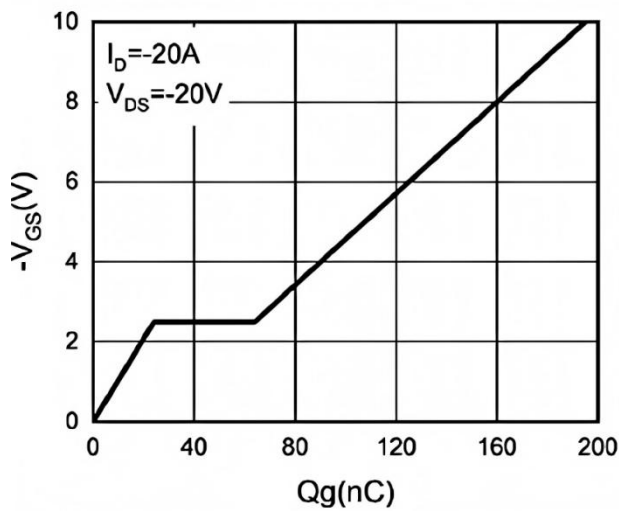


Fig.7 Gate Charge Waveforms

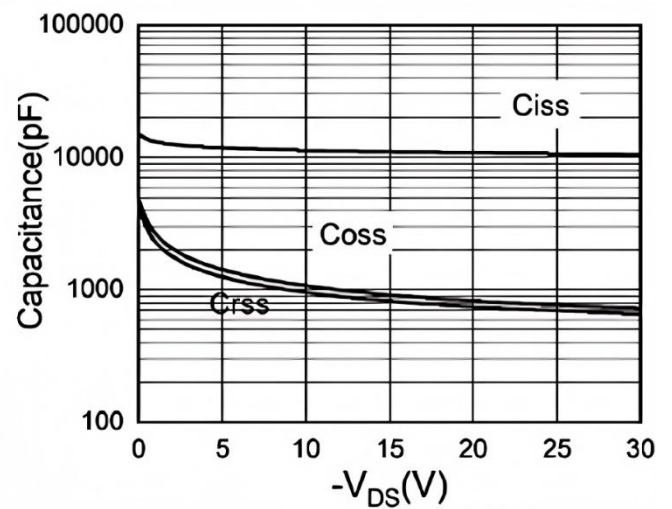


Fig.8 Capacitance

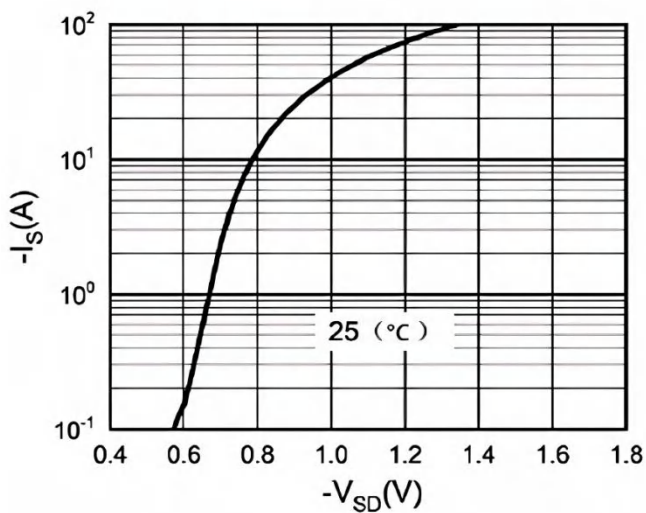


Fig.9 Body-Diode Characteristics

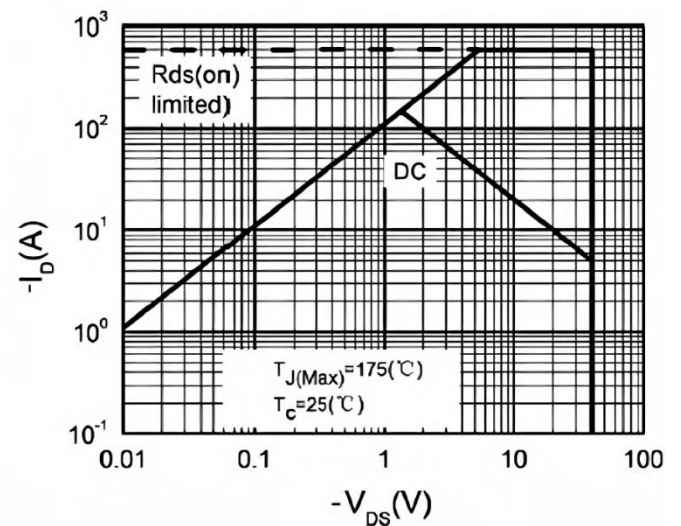
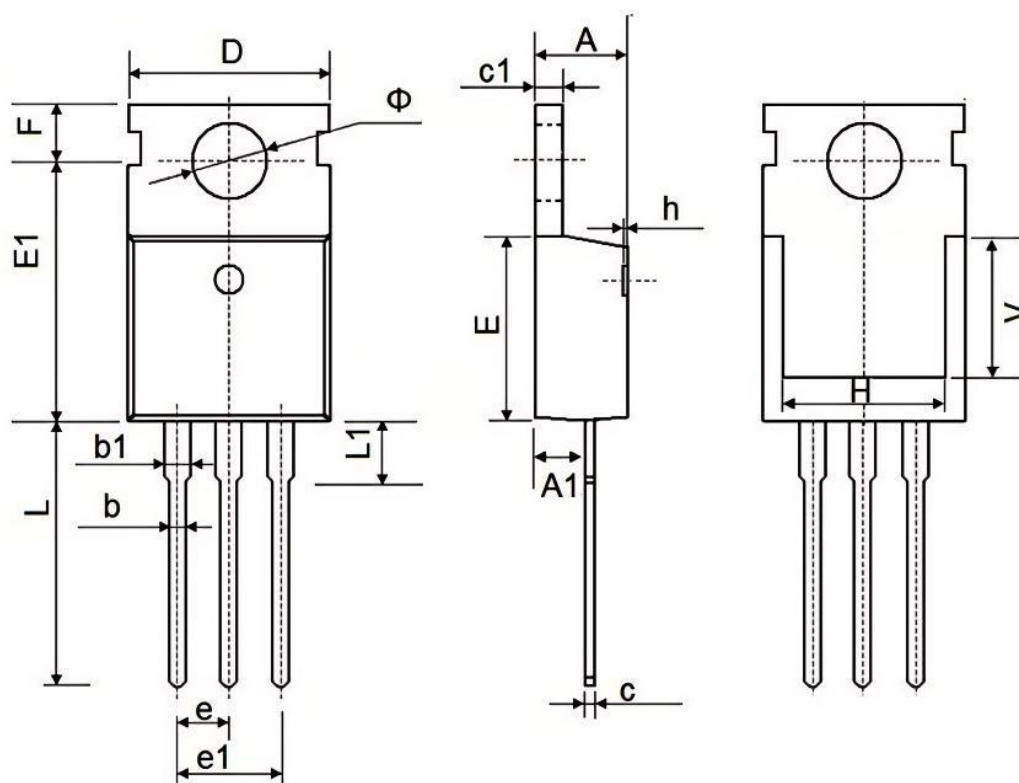


Fig.10 Maximum Safe Operating Area

Ordering Information

Part Number	Package code	Packaging
HSP4119	TO-220	1000/Box

TO-220 Package Outline



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.300	4.700	0.169	0.185
A1	2.200	2.600	0.087	0.102
b	0.700	0.950	0.028	0.037
b1	1.170	1.410	0.046	0.056
C	0.450	0.650	0.018	0.026
c1	1.200	1.400	0.047	0.055
D	9.600	10.400	0.378	0.409
E	8.8500	9.750	0.348	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.750	14.300	0.502	0.563
L1	2.850	3.950	0.112	0.156
V	7.500 REF.		0.295 REF.	
Φ	3.400	4.000	0.134	0.157

HSP4119 Marking:

