

Description

The HSS3415E is the high cell density trenched P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

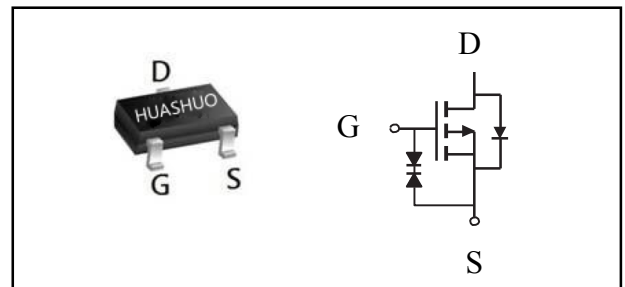
The HSS3415E meet the RoHS and Green Product requirement with full function reliability approved.

- Super Low Gate Charge
- Green Device Available
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology
- ESD Protect 2KV

Product Summary

V_{DS}	-20	V
$R_{DS(ON),max}$	45	m Ω
I_D	-4.3	A

SOT 23 Pin Configurations



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 8	V
$I_D@T_A=25^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V^1$	-4.3	A
$I_D@T_A=70^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V^1$	-3.5	A
I_{DM}	Pulsed Drain Current ²	-14	A
$P_D@T_A=25^\circ C$	Total Power Dissipation ³	1.25	W
$P_D@T_A=70^\circ C$	Total Power Dissipation ³	0.84	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	---	100	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹ (t $\leq 10s$)	---	95	$^\circ C/W$



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	-20	---	---	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} =-4.5V, I _D =-3.5A	---	35	45	mΩ
		V _{GS} =-2.5V, I _D =-3A	---	47	55	
		V _{GS} =-1.8V, I _D =-2A	---	67	80	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =-250uA	-0.45	---	-0.9	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	3.95	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =-16V, V _{GS} =0V, T _J =25°C	---	---	-1	uA
		V _{DS} =-16V, V _{GS} =0V, T _J =55°C	---	---	-5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±12V, V _{DS} =0V	---	---	±100	nA
gfs	Forward Transconductance	V _{DS} =-5V, I _D =-3A	---	12.8	---	S
Q _g	Total Gate Charge (-4.5V)	V _{DS} =-15V, V _{GS} =-4.5V, I _D =-3A	---	8.4	11	nC
Q _{gs}	Gate-Source Charge		---	2.4		
Q _{gd}	Gate-Drain Charge		---	1.5		
T _{d(on)}	Turn-On Delay Time	V _{DD} =-10V, V _{GS} =-4.5V, R _G =3.3Ω, I _D =-3A	---	9	20	ns
T _r	Rise Time		---	4	10	
T _{d(off)}	Turn-Off Delay Time		---	42	85	
T _f	Fall Time		---	5	10	
C _{iss}	Input Capacitance	V _{DS} =-15V, V _{GS} =0V, f=1MHz	---	900		pF
C _{oss}	Output Capacitance		---	155		
C _{rss}	Reverse Transfer Capacitance		---	205		

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current ^{1,4}	V _G =V _D =0V, Force Current	---	---	-4.3	A
I _{SM}	Pulsed Source Current ^{2,4}		---	---	-14	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =-1A, T _J =25°C	---	---	-1	V
t _{rr}	Reverse Recovery Time	I _F =-3A, di/dt=100A/μs, T _J =25°C	---	21.8	---	nS
Q _{rr}	Reverse Recovery Charge		---	6.9	---	nC

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.
- 2.The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- 3.The power dissipation is limited by 150°C junction temperature
- 4.The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.

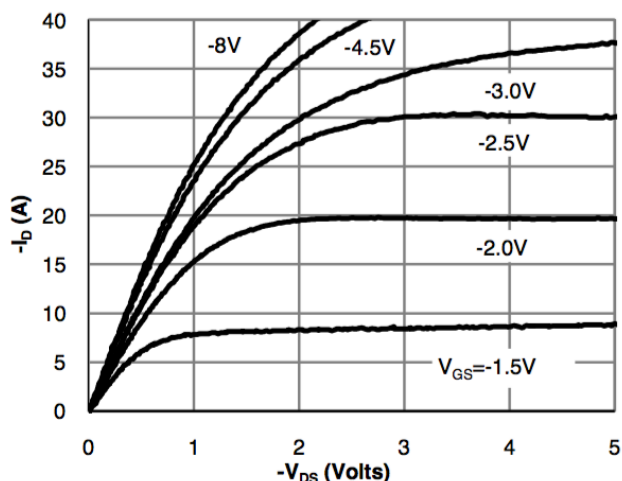


Fig 1: On-Region Characteristics (Note E)

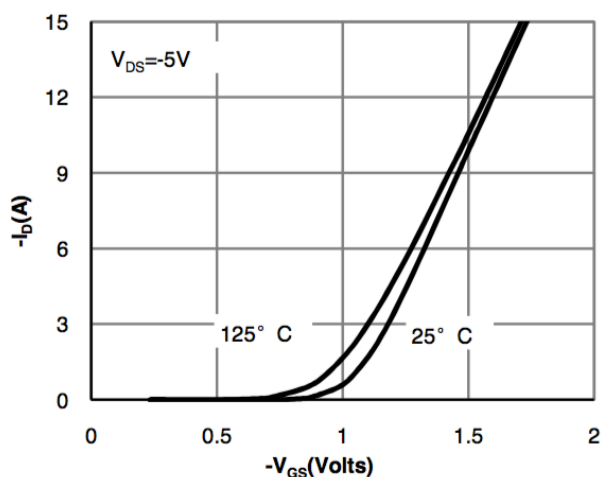


Figure 2: Transfer Characteristics (Note E)

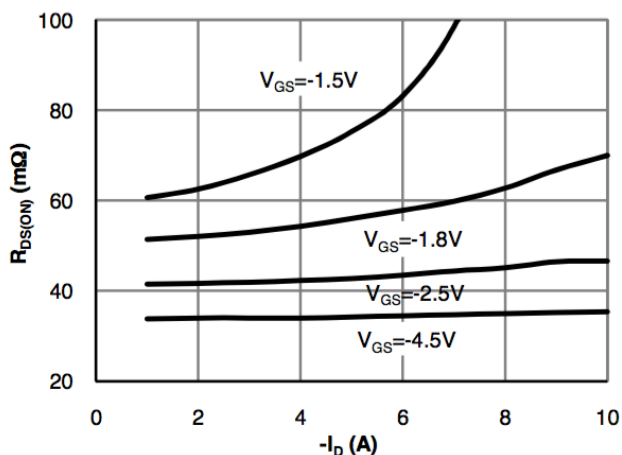


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

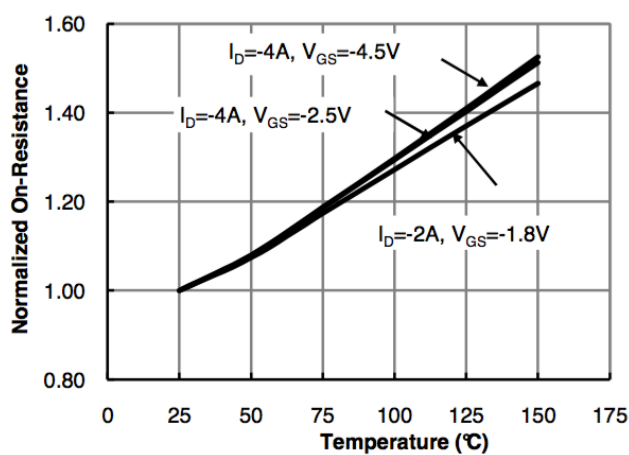


Figure 4: On-Resistance vs. Junction Temperature (Note E)

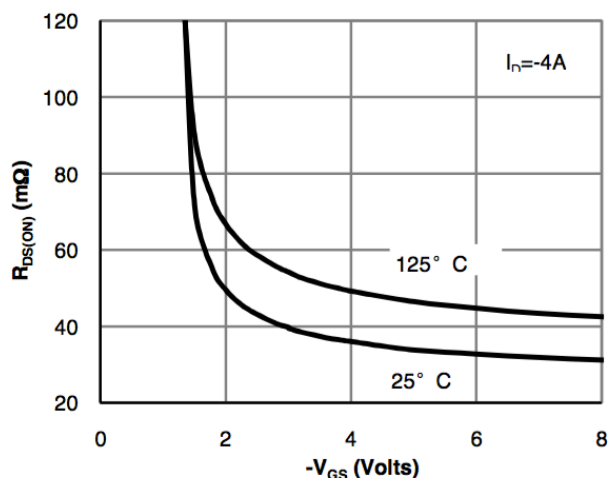


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

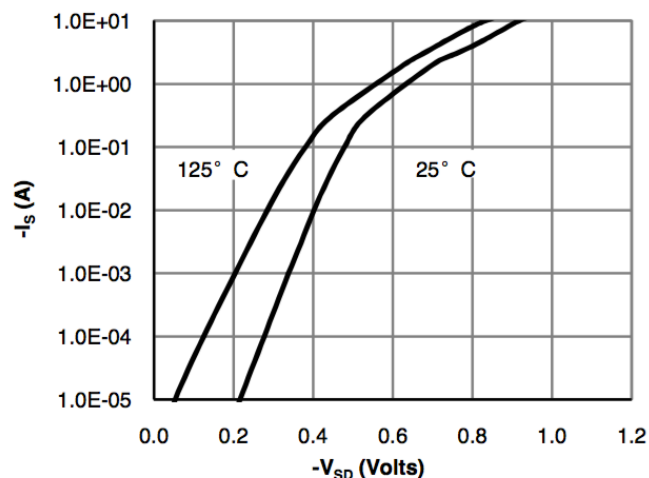


Figure 6: Body-Diode Characteristics (Note E)

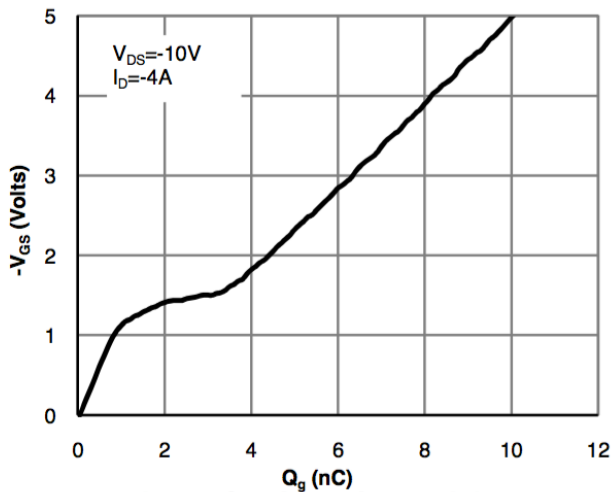


Figure 7: Gate-Charge Characteristics

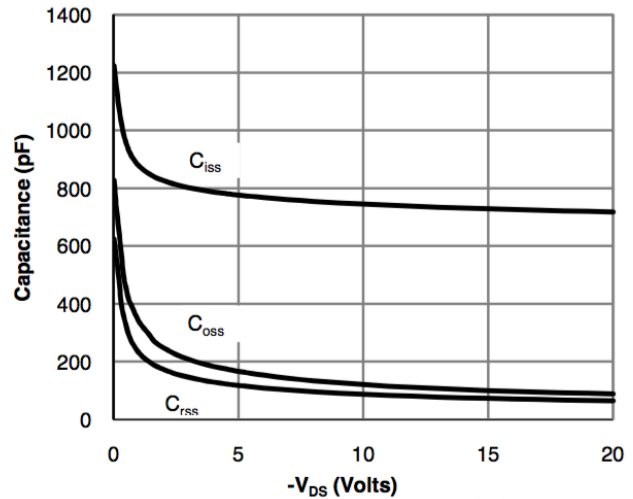


Figure 8: Capacitance Characteristics

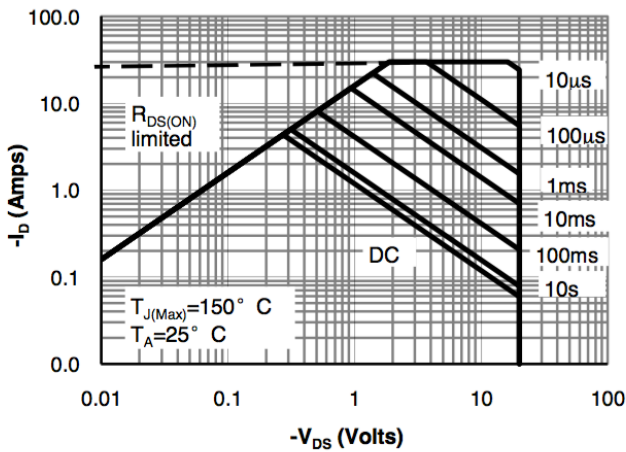


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

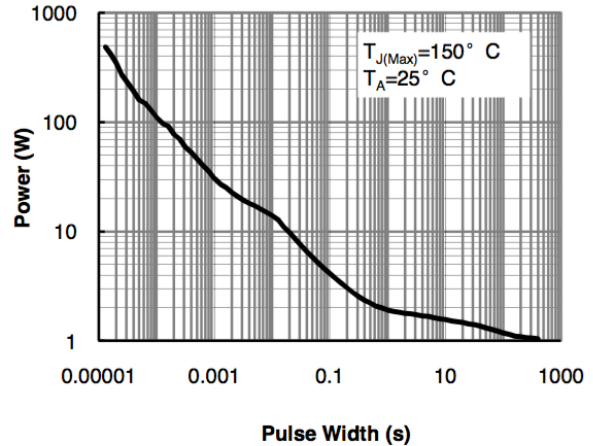


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

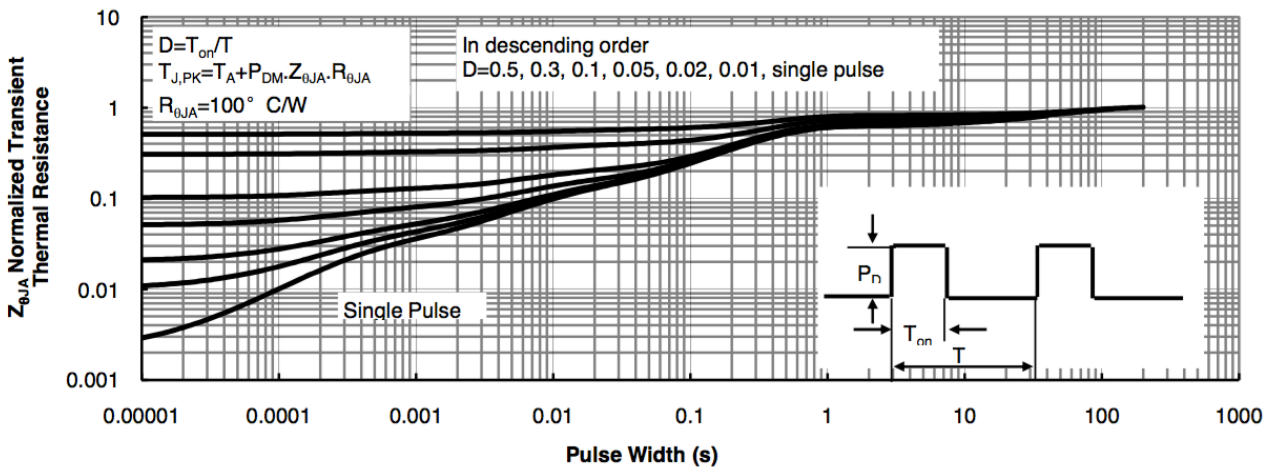
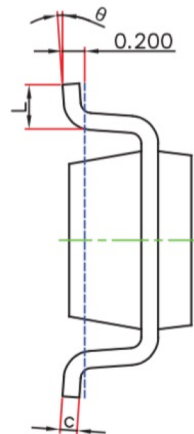
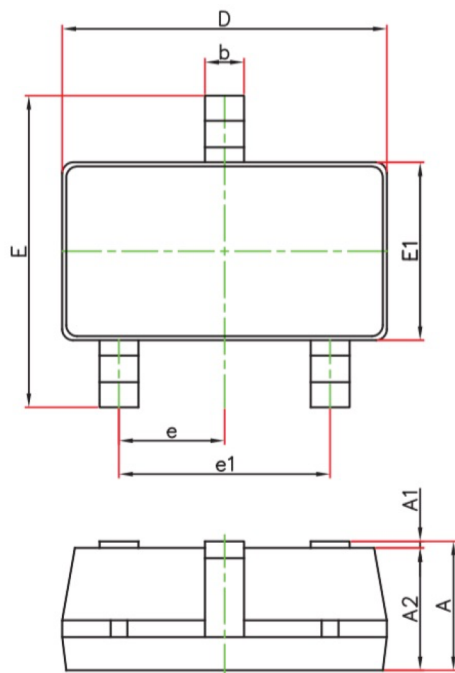


Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)



Ordering Information

Part Number	Package code	Packaging
HSS3415E	SOT-23L	3000/Tape&Reel



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
theta	0°	8°	0°	8°