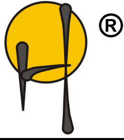


HX3415SI

P-Channel Enhancement Mode Field Effect Transistor

- **Features**

V_{DS} (V) = -20V, I_D = -4A

$R_{DS(ON)}$<55mΩ @ V_{GS}= -4.5V

$R_{DS(ON)}$<63mΩ @ V_{GS}= -2.5V

$R_{DS(ON)}$<73mΩ @ V_{GS}= -1.8V

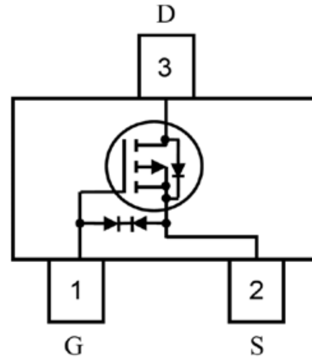
SOT23 Package

ESD Protected:4000V HBM

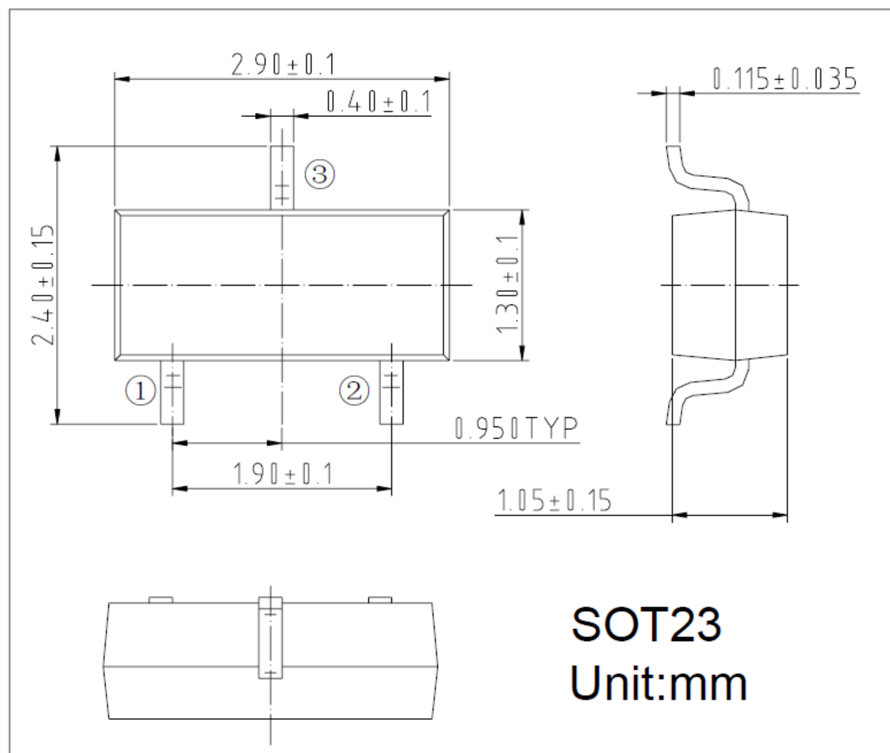
- **General Description**

The HX3415SI uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications. It is ESD protected.

- **Pin Configurations**



- **Package Information**



- **Absolute Maximum Ratings** @T_A=25℃ unless otherwise noted

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	V_{DS}	-20	V

Gate-Source Voltage		V_{GS}	±8	V
Drain Current (Continuous)	T_A=25°C	I_D	-4	A
	T_A=70°C		-3.4	
Drain Current (Pulse)		I_{DM}	-32	A
Power Dissipation	T_A=25°C	P_D	1	W
Operating Temperature/ Storage Temperature		T_J/T_{STG}	-55~150	℃

- **Electrical Characteristics** @T_A=25℃ unless otherwise noted

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
ON/OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D= -250μA	-30	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = -16 V , V_{GS} = 0V	--	--	-1	μA
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS} =V_{DS} , I_{DS}=-250μA	-0.3	-0.65	-1	V
Gate Leakage Current	I_{GSS}	V_{GS}=±12V , V_{DS}=0V	--	--	±10	μA
Drain-Source On-state Resistance	$R_{DS(on)}$	V_{GS} = -4.5V , I_D= -4A	--	42	55	mΩ
		V_{GS} = -2.5V , I_D= -4A	--	48	63	mΩ
		V_{GS} = -1.8V , I_D= -2A	--	56	73	mΩ
Forward Transconductance	g_{FS}	V_{DS}= -5V , I_D= -4A	8	16	--	S
Diode Forward Voltage	V_{SD}	I_{SD}= -1A , V_{GS}= 0V	--	-0.81	-1.0	V
Maximum Body-Diode Continuous Current	I_S		--	--	-2.2	A
Switching CHARACTERISTICS						
Total Gate Charge	Q_g	V_{DS} = -10V, I_D = -4A V_{GS} = -4.5V	--	4.59	5.97	nC
Gate-Source Charge	Q_{gs}		--	2.14	2.78	nC
Gate-Drain Charge	Q_{gd}		--	2.51	3.26	nC
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = -10V, R_L=2.5Ω I_D = -4A, V_{GEN} = -4.5V R_G = 3Ω	--	965.2	1930.4	ns
Turn-on Rise Time	tr		--	1604	3208	ns
Turn-off Delay Time	$t_{d(off)}$		--	7716	15432	ns
Turn-off Fall Time	tf		--	3452	6904	ns
Dynamic CHARACTERISTICS						
Input Capacitance	C_{iss}	V_{GS}=0V,V_{DS}= -10V f= 1.0MHz	--	36.45	--	pF
Output Capacitance	C_{oss}		--	128.57	--	pF
Reverse Transfer Capacitance	C_{rss}		--	15.17	--	pF

Notes:

1. Pulse width limited by maximum junction temperature.
2. Pulse test: PW≤300μs, duty cycle≤2%.
3. For design AID only, not subject to production testing.
4. Switching time is essentially independent of operating temperature.

Typical Performance Characteristics

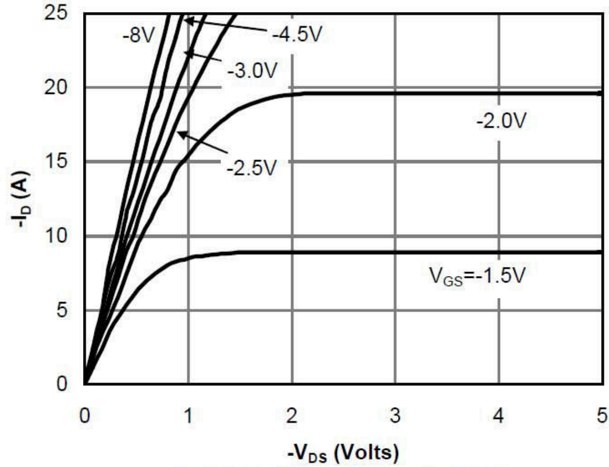


Fig 1: On-Region Characteristics

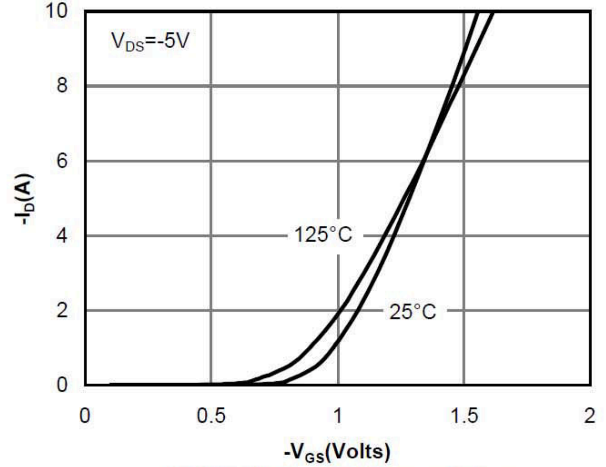


Figure 2: Transfer Characteristics

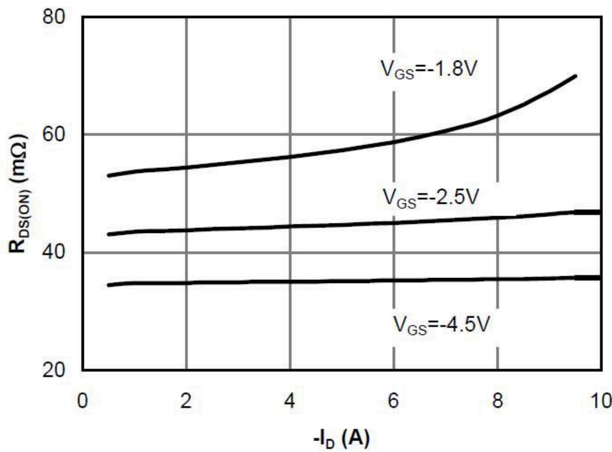


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

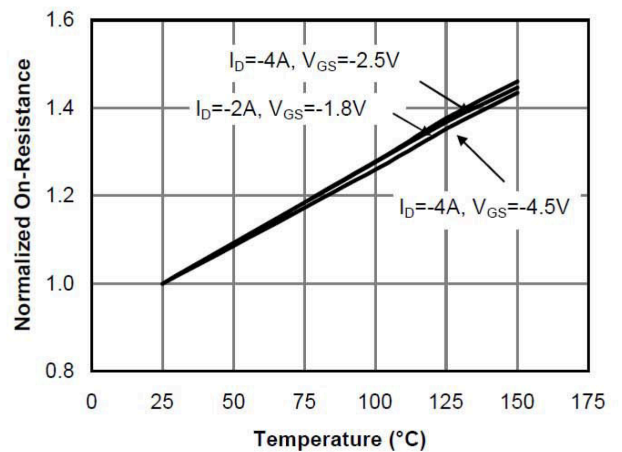


Figure 4: On-Resistance vs. Junction Temperature

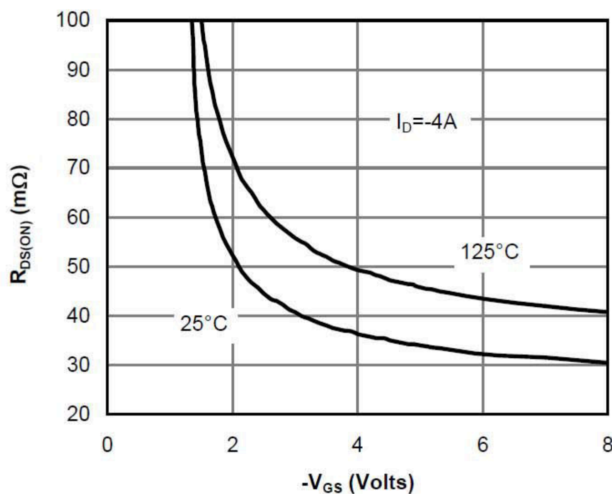


Figure 5: On-Resistance vs. Gate-Source Voltage

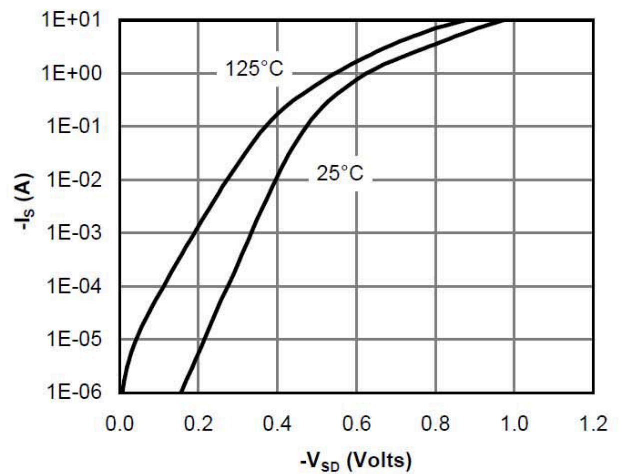


Figure 6: Body-Diode Characteristics

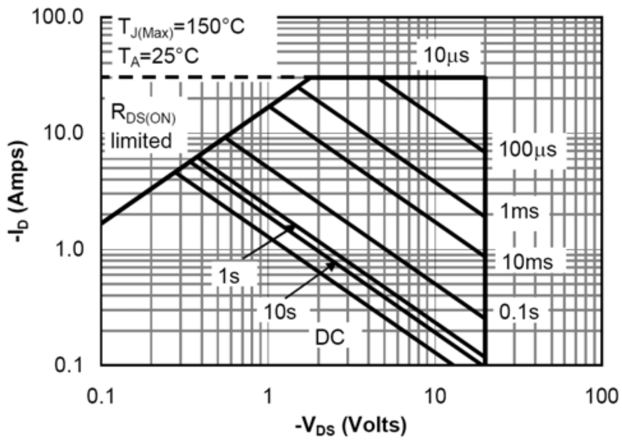


Figure 7: Maximum Forward Biased Safe Operating Area

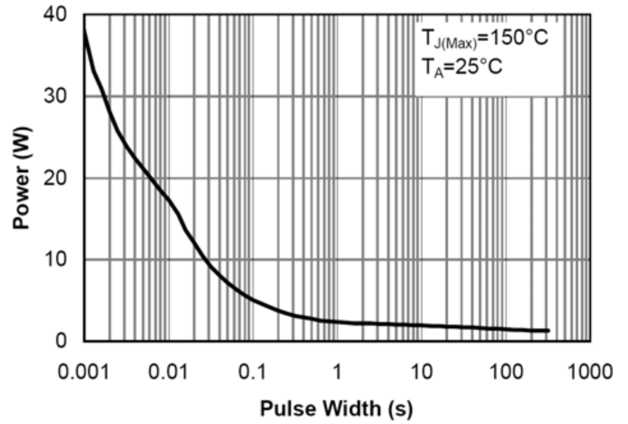


Figure 8: Single Pulse Power Rating Junction-to-Ambient

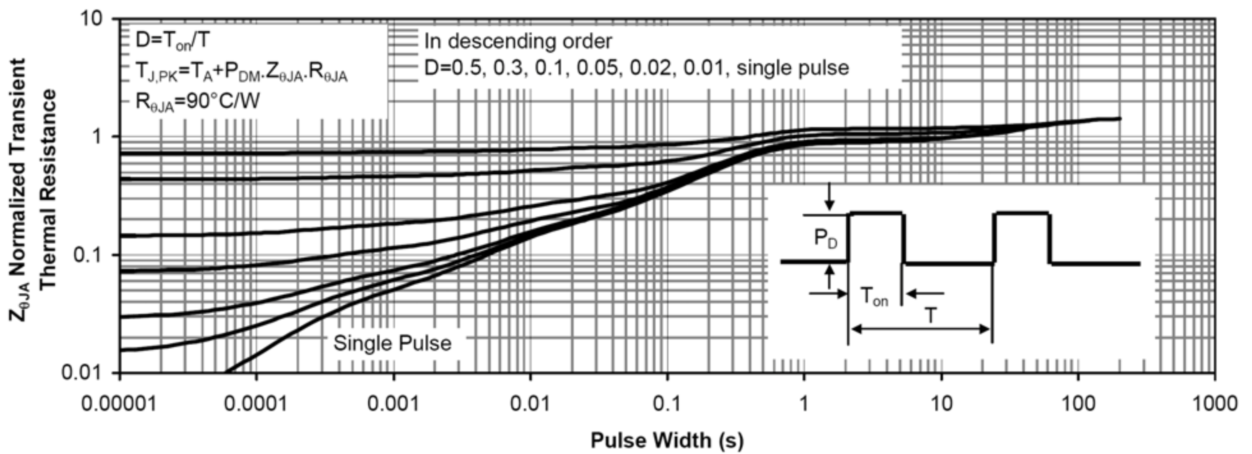


Figure 9: Normalized Maximum Transient Thermal Impedance

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