P-Channel Enhancement Mode Field Effect Transistor

- **Features**

V_{DS} (V) = -20V, I_D = -7A

$R_{DS(ON)}$<30mΩ @ V_{GS}= -4.5V

$R_{DS(ON)}$<40mΩ @ V_{GS}= -2.5V

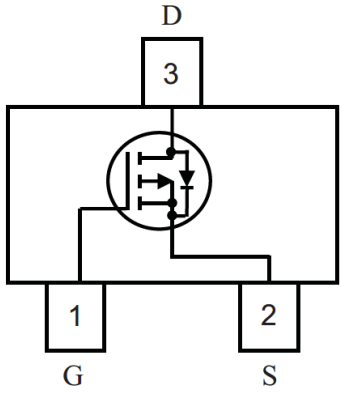
$R_{DS(ON)}$<55mΩ @ V_{GS}= -1.8V

SOT-23 Package

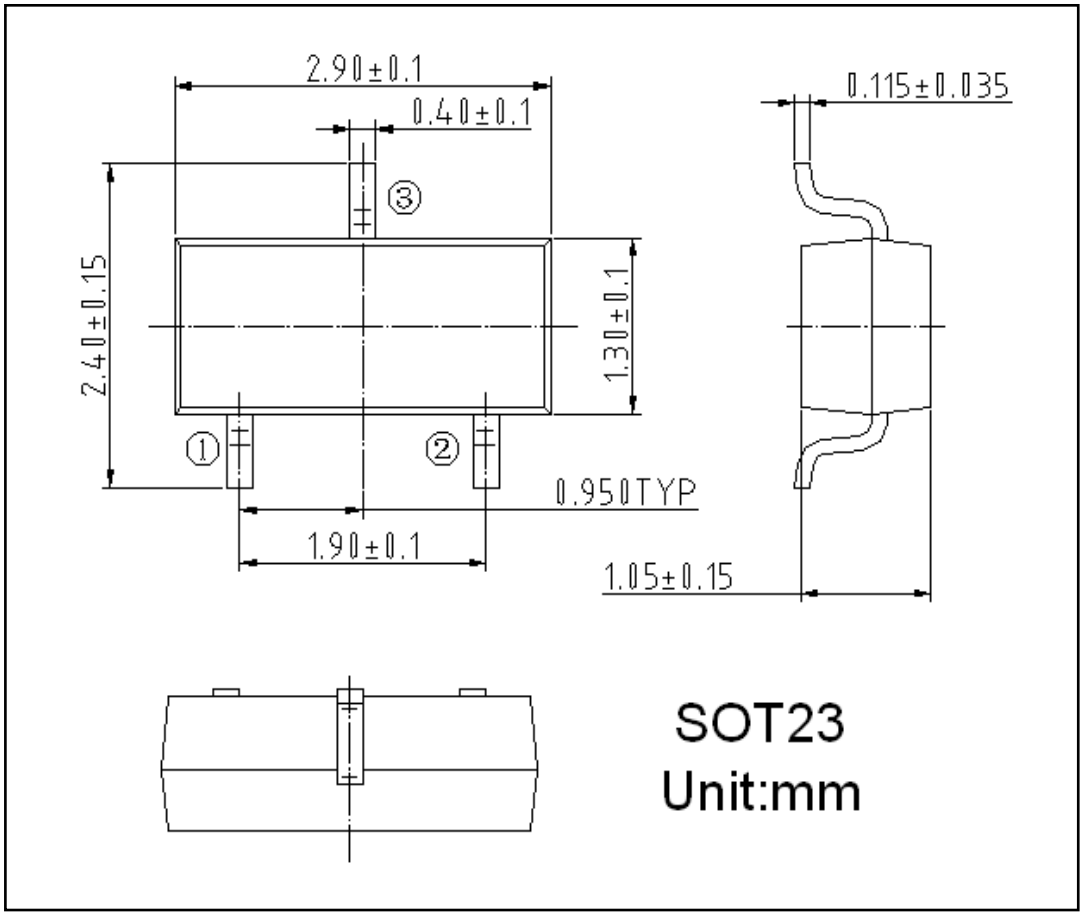
- **General Description**

The HX3413 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation gate voltages as low as 1.8V. This device is suitable for use as a load switch or other general applications.

- **Pin Configurations**



- **Package Information**



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

Parameter		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DSS}	-20	V
Gate-Source Voltage		V_{GSS}	±10	V
Drain Current (Continuous)	T_A=25°C	I_D	-7.0	A
	T_A=70°C		-5.8	
Drain Current (Pulse)		I_{DM}	-30	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	-20	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = -20 V , V_{GS} = 0V	--	--	-1	μA
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS} =V_{DS} , I_{DS}=-250μA	-0.6	-0.8	-1.4	V
Gate Leakage Current	I_{GSS}	V_{GS}=±10V , V_{DS}=0V	--	--	±100	nA
Drain-Source On-state Resistance	$R_{DS(on)}$	V_{GS} = -4.5V , I_D= -7A	--	23	30	mΩ
		V_{GS} = -2.5V , I_D= -2A	--	29	40	mΩ
		V_{GS} = -1.8V , I_D= -1.5A	--	38	55	mΩ
Forward Transconductance	g_{FS}	V_{DS}= -5V , I_D= -4A	--	10	--	S
Diode Forward Voltage	V_{SD}	I_{SD}= -1A , V_{GS}= 0V	--	-0.78	-1.0	V
Switching CHARACTERISTICS						
Total Gate Charge	Q_g	V_{GS}= -4.5V, V_{DS}= -10V, I_D= -4A	--	9.5	--	nC
Gate-Source Charge	Q_{gs}		--	1.2	--	nC
Gate-Drain Charge	Q_{gd}		--	2.2	--	nC
Turn-on Delay Time	$t_{d(on)}$	V_{DS} = -10V, RL= 2.5Ω I_D = -3A, V_{GS} = -4.5V R_G = 3Ω	--	18	--	ns
Turn-on Rise Time	tr		--	11	--	ns
Turn-off Delay Time	$t_{d(off)}$		--	36.7	--	ns
Turn-off Fall Time	tf		--	48	--	ns
Dynamic CHARACTERISTICS						
Input Capacitance	Ciss	V_{GS}=0V,V_{DS}= -10V,f= 1.0MHz	--	826	--	pF
Output Capacitance	Coss		--	90.7	--	pF
Reverse Transfer Capacitance	Crss		--	53.2	--	pF

Pulse Test: Pulse Width ≤μ300s, Duty Cycle≤ 2.0%

Typical Performance Characteristics

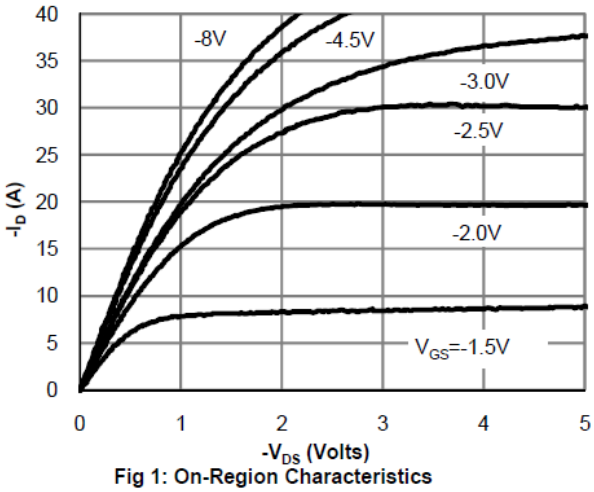


Fig 1: On-Region Characteristics

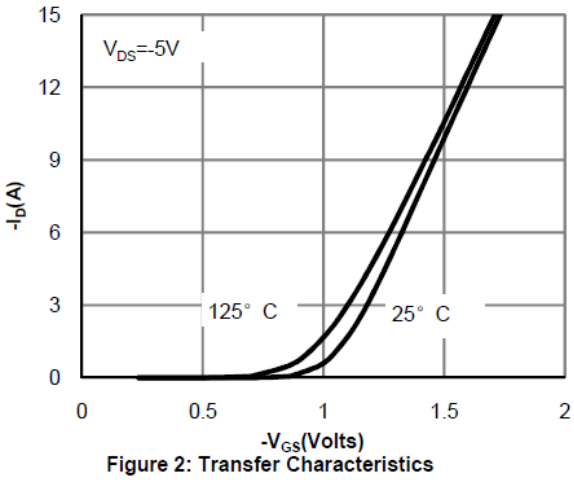


Figure 2: Transfer Characteristics

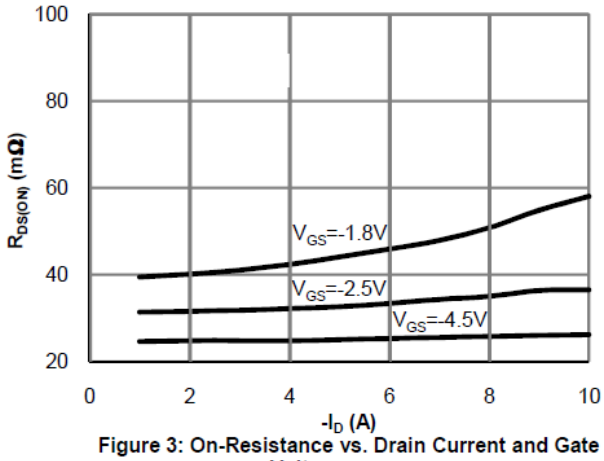


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

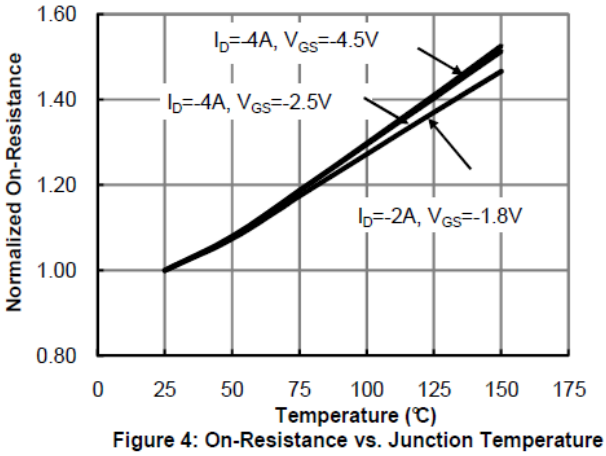


Figure 4: On-Resistance vs. Junction Temperature

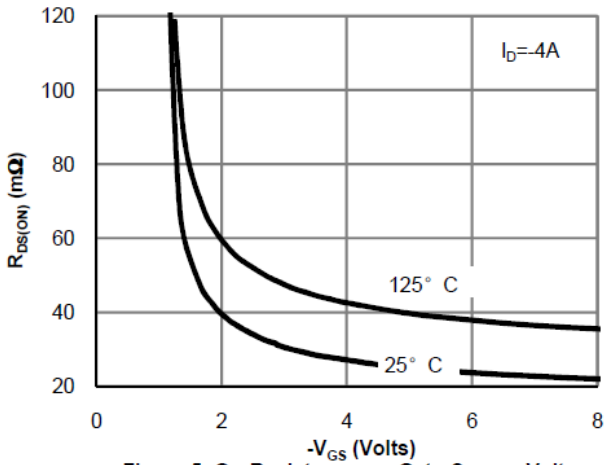


Figure 5: On-Resistance vs. Gate-Source Voltage

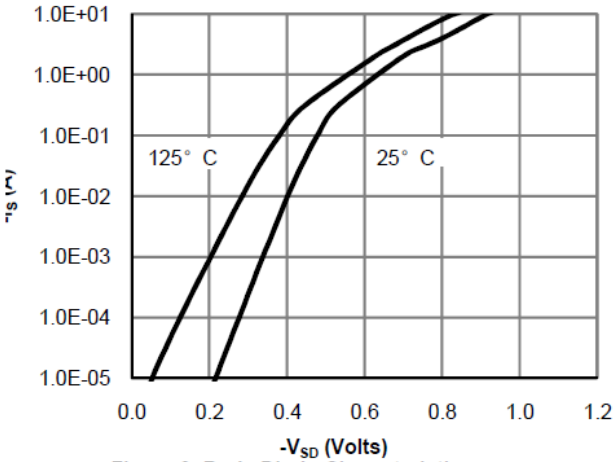


Figure 6: Body-Diode Characteristics

Typical Performance Characteristics

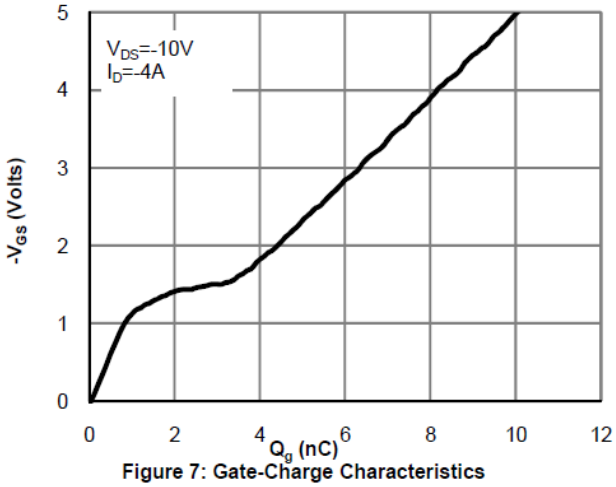


Figure 7: Gate-Charge Characteristics

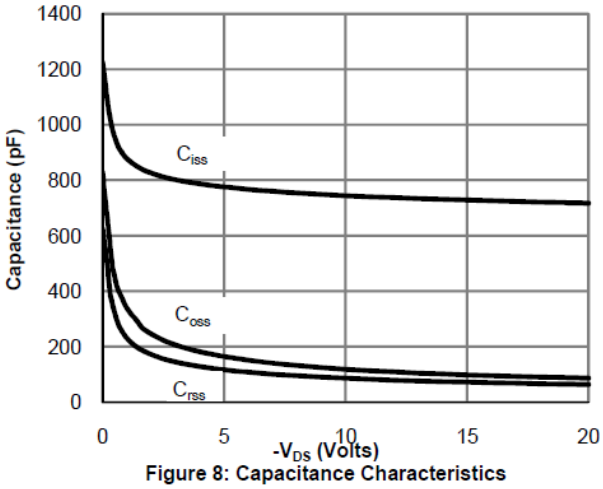


Figure 8: Capacitance Characteristics

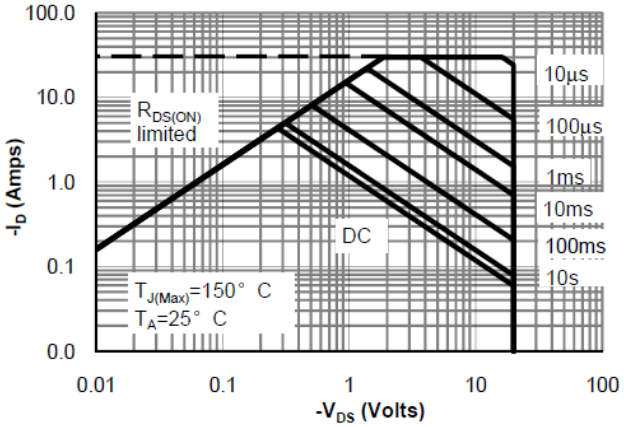


Figure 9: Maximum Forward Biased Safe Operating Area

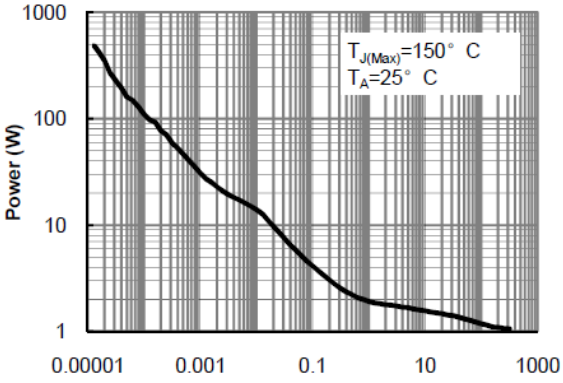


Figure 10: Single Pulse Power Rating Junction-to-Ambient

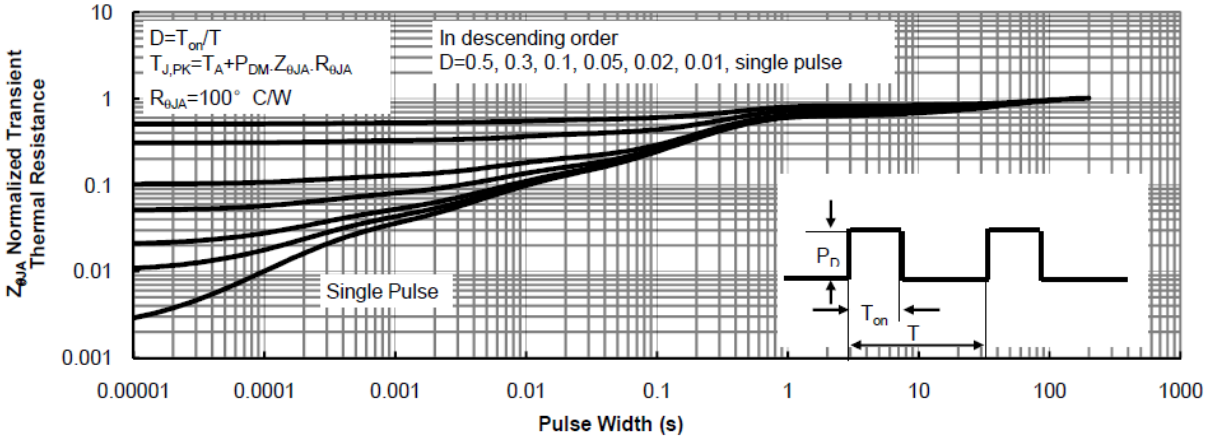


Figure 11: Normalized Maximum Transient Thermal Impedance

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