

HC3416

20V N-Channel MOSFET

General Description

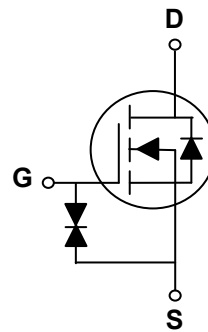
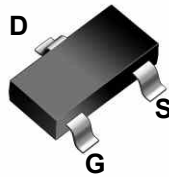
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

Features

V_{DS}	20V
I_D (at $V_{GS}=4.5V$)	7A
$R_{DS(ON)}$ (at $V_{GS}=4.5V$)	18mΩ(Max)

ESD protected up to 2KV

SOT23



Absolute Maximum Ratings $T_A=25^\circ C$ unless otherwise noted

Parameter	Symbol	Maximum	Units	
Drain-Source Voltage	V_{DS}	20	V	
Gate-Source Voltage	V_{GS}	±12	V	
Drain Current-Continuous	TC=25°C	I_D	7.0	A
	TC=100°C	I_D	5.6	A
Drain Current – Pulsed	I_{DM}	30	A	
Maximum Power Dissipation	P_D	1.3	W	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	°C	

Thermal Characteristics

Parameter	Symbol	Typ	Max	Unit
Thermal Resistance junction-case	$R_{\theta Jc}$		1.1	°C /W
Thermal Resistance junction-to-Ambient	$R_{\theta JA}$		62	°C /W

Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	20			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =20V, V _{GS} =0V			1	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±12V, V _{DS} =0V			±15	μA
		V _{GS} =±10V, V _{DS} =0V			±10	μA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.45	0.6	1.0	V
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =4.5V, I _D =7.0A		13	18	mΩ
		V _{GS} =2.5V, I _D =4.0A		17	22	mΩ
		V _{GS} =1.8V, I _D =3.0A		27	39	mΩ
DYNAMIC PARAMETERS						
C _{iSS}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, F=1.0MHz		980		pF
C _{oSS}	Output Capacitance			225		pF
C _{rSS}	Reverse Transfer Capacitance			120		pF
SWITCHING PARAMETERS						
t _{d(on)}	Turn-on Delay Time	V _{GS} =4.5V V _{DS} =10V R _L =1.5Ω R _G =3Ω		1.2		nS
t _r	Turn-on Rise Time			2.4		nS
t _{d(off)}	Turn-Off Delay Time			22		nS
t _f	Turn-Off Fall Time			7		nS
Q _g	Total Gate Charge	V _{DS} =10V, I _D =7.0A, V _{GS} =4.5V		8.1		nC
Q _{gs}	Gate-Source Charge			2.4		nC
Q _{gd}	Gate-Drain Charge			3		nC
V _{SD}	Diode Forward Voltage	V _{GS} =0V, I _{SD} =1A		0.70	1.3	V

Note:

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width ≅ 300us , duty cycle ≅ 2%.
3. Essentially independent of operating temperature.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

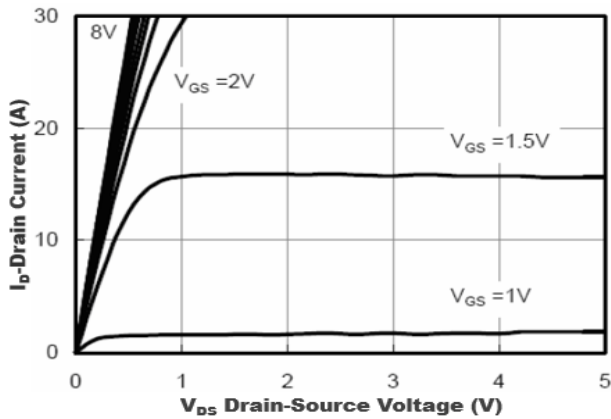


Figure1. Output Characteristics

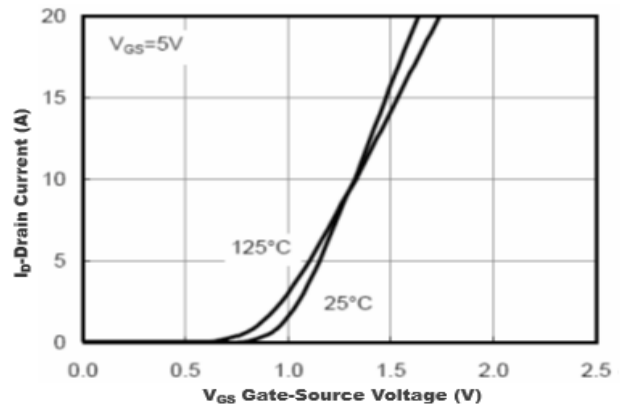


Figure2. Transfer Characteristics

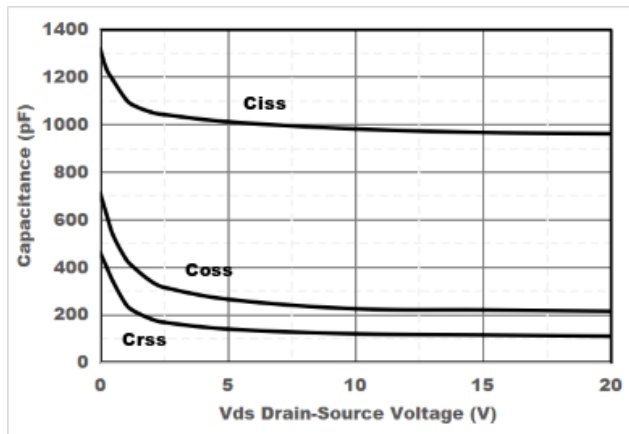


Figure3. Capacitance Characteristics

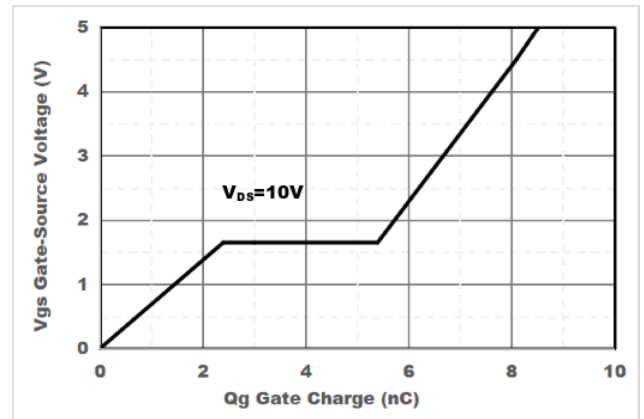


Figure4. Gate Charge

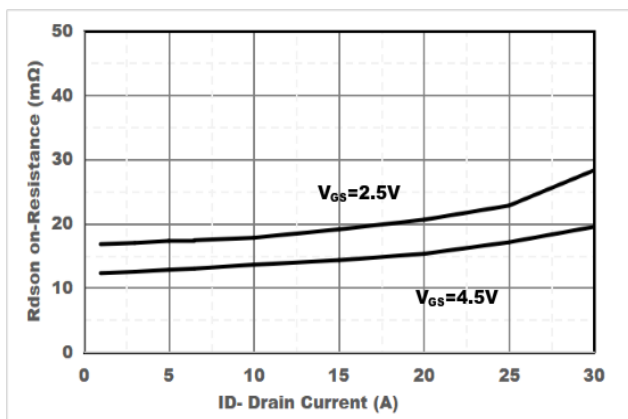


Figure5. Drain-Source on Resistance

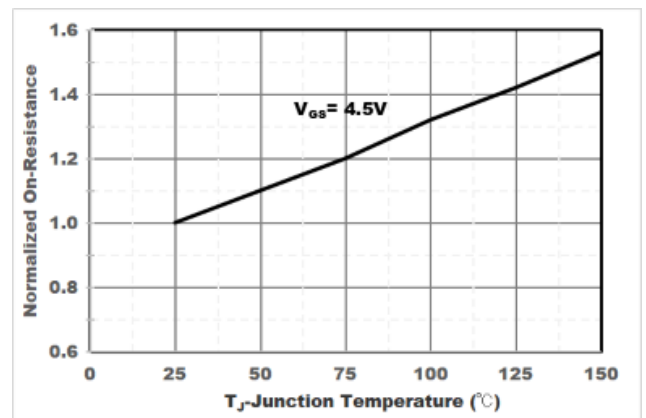


Figure6. Drain-Source on Resistance

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

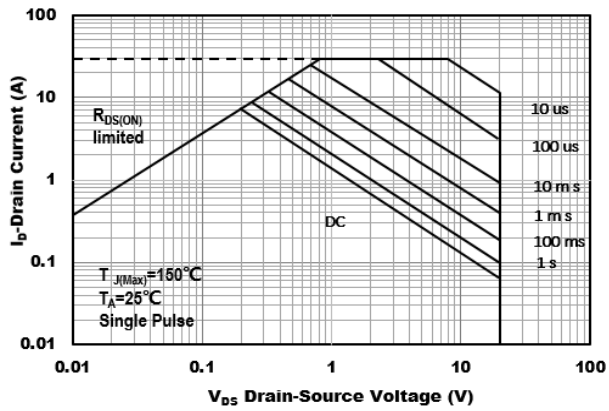


Figure7. Safe Operation Area

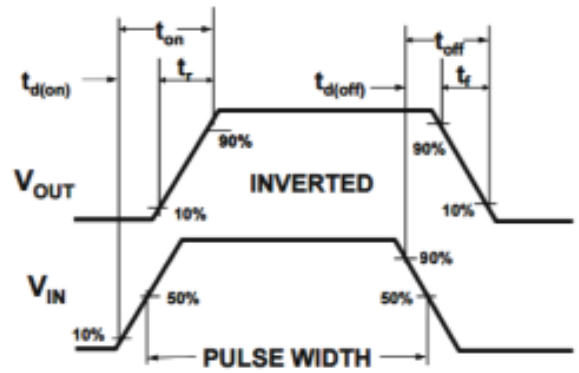
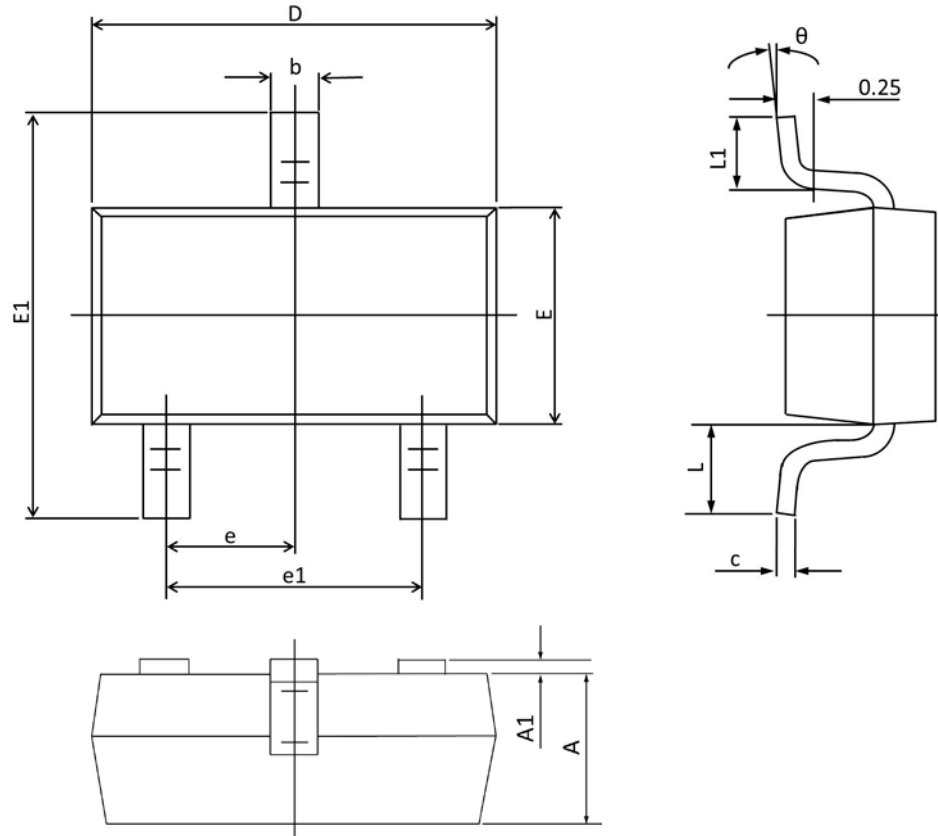


Figure8. Switching wave

SOT23 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.000	0.035	0.039
A1	0.000	0.100	0.000	0.004
b	0.300	0.500	0.012	0.020
c	0.090	0.110	0.003	0.004
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	1°	7°	1°	7°