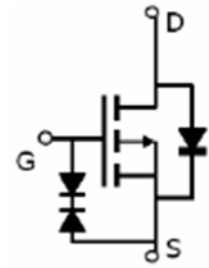


## -20V P-Channel MOSFETs

### Description

#### Features

- $V_{DS} = -20V$ ,  $I_D = -4A$
- $R_{DS(ON)} = 38m\Omega$  (Typ.) @  $V_{GS} = -4.5V$   
 $R_{DS(ON)} = 48m\Omega$  (Typ.) @  $V_{GS} = -2.5V$
- High Power and Current Handling Capability
- Lead Free Product is Acquired
- Surface Mount Package
- ESD Rating: HBM 2.0KV



SOT-23

#### Application

- PWM Applications
- Load Switch
- Power Management

### Absolute Maximum Ratings (T<sub>C</sub>=25°C unless otherwise specified)

Symbol	Parameter	Max.	Units
V <sub>DSS</sub>	Drain-Source Voltage	-20	V
V <sub>GSS</sub>	Gate-Source Voltage	±8	V
I <sub>D</sub>	Continuous Drain Current	T <sub>C</sub> = 25°C	-4
		T <sub>C</sub> = 100°C	-2.6
I <sub>DM</sub>	Pulsed Drain Current <sup>note1</sup>	-20	A
P <sub>D</sub>	Power Dissipation	1.67	W
R <sub>θJA</sub>	Thermal Resistance, Junction to Ambient	75	°C/W
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range	-55 to +150	°C

**Electrical Characteristics** ( $T_C=25^{\circ}\text{C}$  unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D = -250\mu A$	-20	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = -20V, V_{GS} = 0V,$	-	-	-1	$\mu A$
$I_{GSS}$	Gate to Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 8V$	-	-	$\pm 10$	$\mu A$
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu A$	-0.4	-	-1.0	V
$R_{DS(on)}$	Static Drain-Source on-Resistance note2	$V_{GS} = -4.5V, I_D = -4A$	-	38	48	m $\Omega$
		$V_{GS} = -2.5V, I_D = -3A$	-	48	65	
$g_{FS}$	Forward Transconductance	$V_{DS} = -5V, I_D = -4A$	8	-	-	S
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS} = -10V, V_{GS} = 0V,$ $f = 1.0MHz$	-	950	-	pF
$C_{oss}$	Output Capacitance		-	165	-	pF
$C_{rss}$	Reverse Transfer Capacitance		-	120	-	pF
$Q_g$	Total Gate Charge	$V_{DS} = -10V, I_D = -4A,$ $V_{GS} = -4.5V$	-	12	-	nC
$Q_{gs}$	Gate-Source Charge		-	1.4	-	nC
$Q_{gd}$	Gate-Drain("Miller") Charge		-	3.6	-	nC
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = -10V, V_{GS} = -4.5A,$ $R_L = 2.5\Omega, R_{GEN} = 3\Omega$	-	12	-	ns
$t_r$	Turn-on Rise Time		-	10	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	19	-	ns
$t_f$	Turn-off Fall Time		-	25	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain to Source Diode Forward Current		-	-	-4	A
$I_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-20	A
$V_{SD}$	Drain to Source Diode Forward Voltage	$V_{GS} = 0V, I_S = -4A$	-	-	-1.2	V

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

 2. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$

### Typical Performance Characteristics

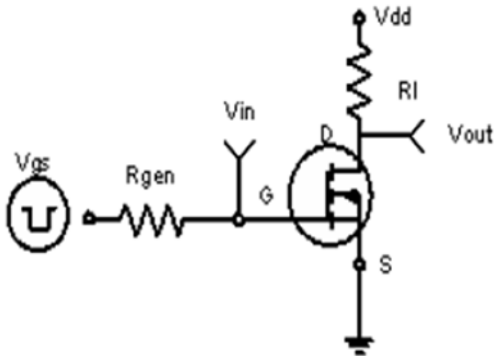


Figure1 :Switching Test Circuit

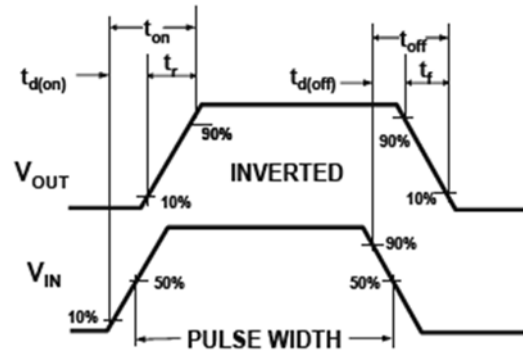
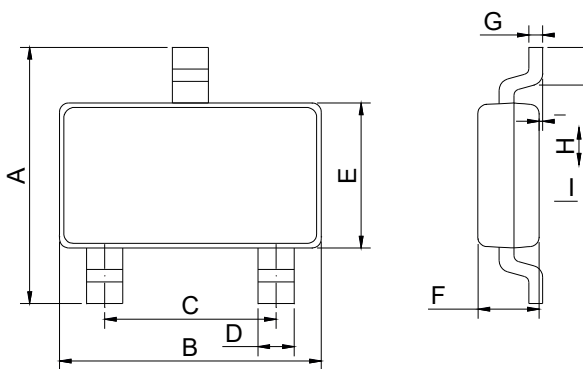


Figure2:Switching Waveforms

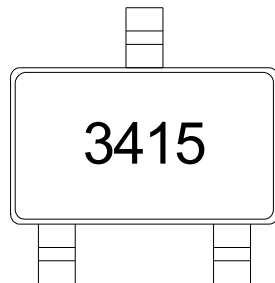
### Package Mechanical Data



SOT-23

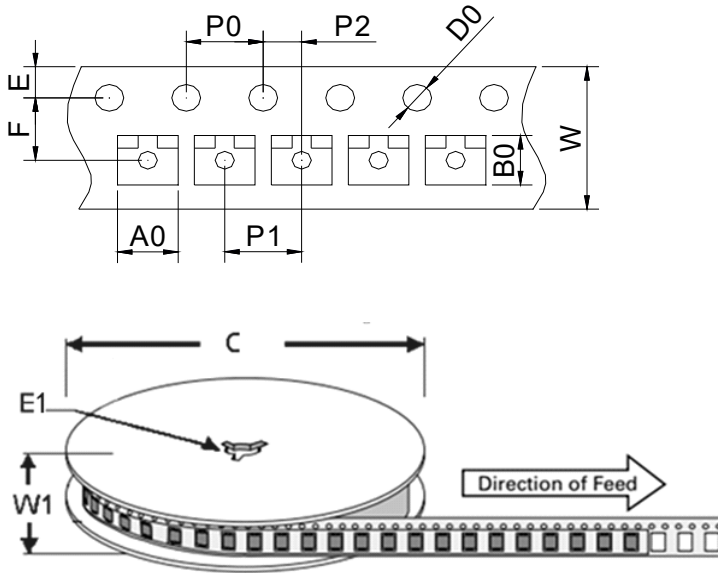
Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.30	2.40	2.50	0.091	0.095	0.098
B	2.80	2.90	3.00	0.110	0.114	0.118
C	1.90 REF			0.075 REF		
D	0.35	0.40	0.45	0.014	0.016	0.018
E	1.20	1.30	1.40	0.047	0.051	0.055
F	0.90	1.00	1.10	0.035	0.039	0.043
G		0.10	0.15		0.004	0.006
H	0.20			0.008		
I	0		0.10	0		0.004

### Marking



3415: Device Code

### Package Information-SOT-23



Ref.	Dimensions	
	Millimeters	Inches
A0	3.15 ± 0.3	0.124 ± 0.012
B0	2.77 ± 0.3	0.109 ± 0.012
C	178	7.0
D0	1.50±0.1	0.059 ± 0.004
E	1.75 ± 0.2	0.069 ± 0.008
E1	13.3±0.3	0.524± 0.012
F	3.5 ± 0.2	0.138 ± 0.008
P0	4.00 ± 0.2	0.157 ± 0.008
P1	4.00 ± 0.2	0.157 ± 0.008
P2	2.00 ± 0.2	0.079 ± 0.008
W	8.00 ± 0.2	0.315 ± 0.008
W1	11.5±1.0	0.453 ± 0.039

### Ordering Information-SOT-23

OUTLINE	PACKAGE TYPE	QUANTITY REEL	DESCRIPTION
TAPING	SOT-23	3,000pcs	7 inch reel pack

### Revision history

Date	Revision	Changes
28-May-2020	1.0	Initial release

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