

Description

The LM3416AK uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

$V_{DS} = 20V$ $I_D = 6.8A$

$R_{DS(ON)} < 22m\Omega$ @ $V_{GS}=4.5V$ (Typ.15m Ω)

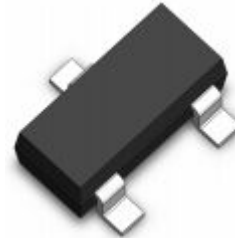
Application

Lithium battery protection

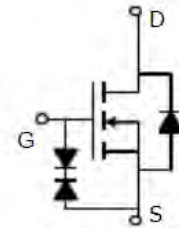
Wireless impact

Mobile phone fast charging

Dimensions SOT-23



Pin Configuration



Package Marking and Ordering Information

Device	Device Marking	Device Package	Reel Size	Tape width	Quantity
LM3416AK	3416	SOT-23	Ø180mm	8 mm	3000 units

Absolute Maximum Ratings (TC=25°C unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	± 12	V
$I_D@T_A=25^\circ C$	Continuous Drain Current	6.8	A
$I_D@T_A=70^\circ C$	Continuous Drain Current	6.0	A
I_{DM}	Pulsed Drain Current ²	30	A
$P_D@T_A=25^\circ C$	Total Power Dissipation ³	1.5	W
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C
$R_{\theta JA}$	Thermal Resistance Junction-ambient ¹	125	°C/W

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

Symbol	Parameter	Conditions	Min	Typ	Max	Units
BVDSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	20	22		V
VGS(th)	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D =250μA	0.50	0.65	1.0	V
RDS(ON)	Static Drain-Source On-Resistance	V _{GS} =4.5V, I _D =4A		15	22	mΩ
RDS(ON)	Static Drain-Source On-Resistance	V _{GS} =2.5V, I _D =3A		20	30	
IDSS	Zero Gate Voltage Drain Current	V _{DS} =20V, V _{GS} =0V			1	μA
IGSS	Gate-Body Leakage Current	V _{GS} =±10V, V _{DS} =0V			±100	nA
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1MHZ		780		pF
C _{oss}	Output Capacitance			140		
C _{rss}	Reverse Transfer Capacitance			80		
Q _g	Total Gate Charge	V _{GS} =4.5V, V _{DS} =10V, I _D =6.8A		11		nC
Q _{gs}	Gate-Source Charge			2.3		
Q _{gd}	Gate-Drain Charge			2.9		
t _{D(on)}	Turn-on Delay Time	V _{GS} =4.5V, V _{DS} =10V, I _D =6.8A R _{GEN} =3Ω		9		ns
t _r	Turn-on Rise Time			30		
t _{D(off)}	Turn-off Delay Time			35		
t _f	Turn-off fall Time			10		
V _{SD}	Diode Forward Voltage	I _S =6.8A, V _{GS} =0V			1.2	V

Note :

- 1、 The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ 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 ID and IDM , in real applications , should be limited by total power dissipation

Typical Characteristics

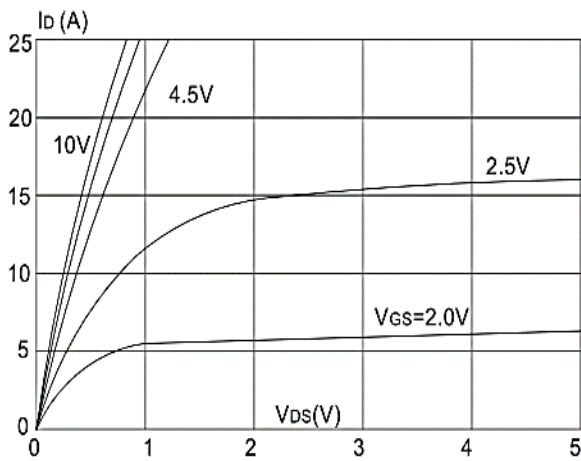


Figure 1: Output Characteristics

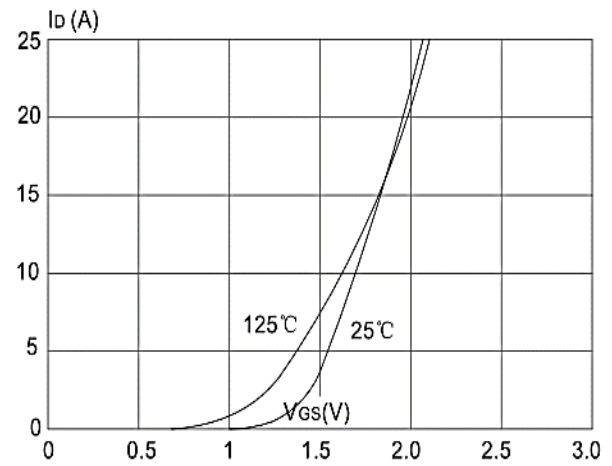


Figure 2: Typical Transfer Characteristics

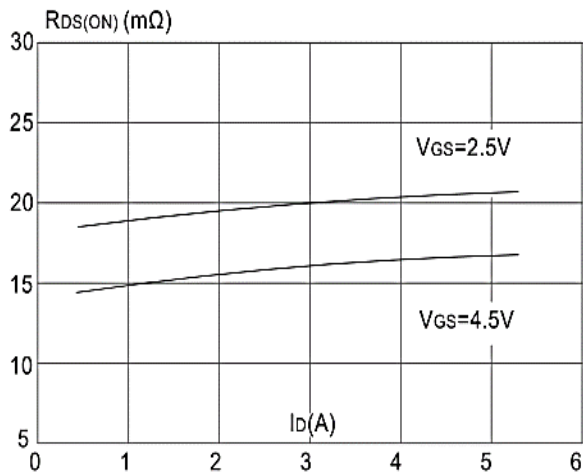


Figure 3: On-resistance vs. Drain Current

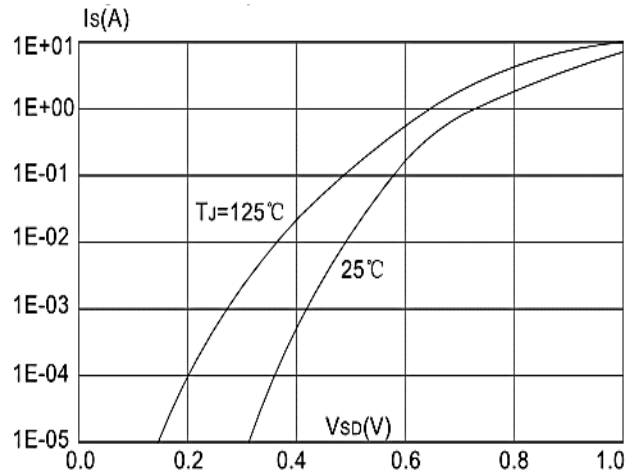


Figure 4: Body Diode Characteristics

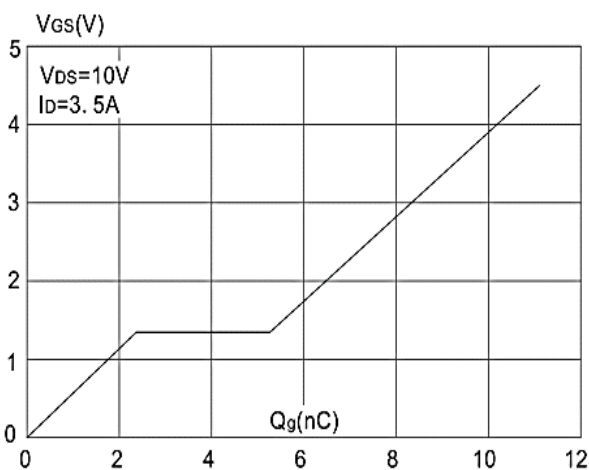


Figure 5: Gate Charge Characteristics

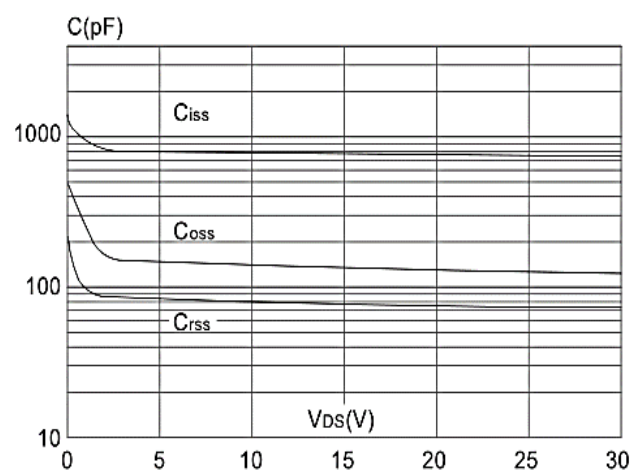


Figure 6: Capacitance Characteristics

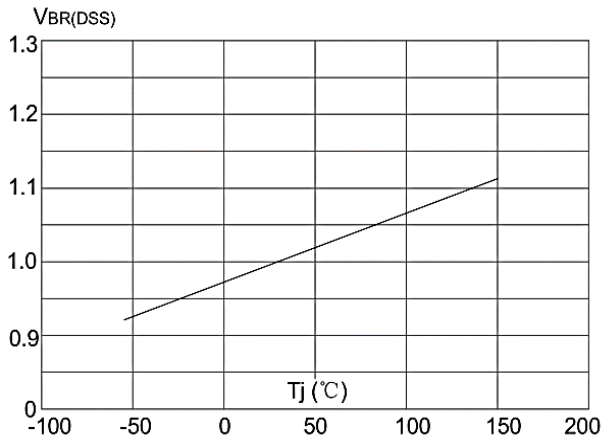


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

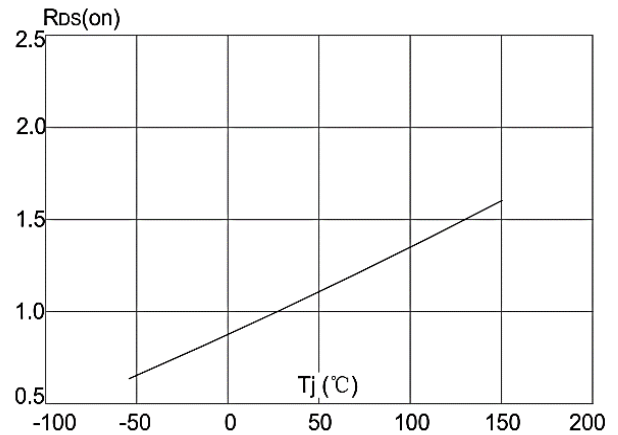


Figure 8: Normalized on Resistance vs. Junction Temperature

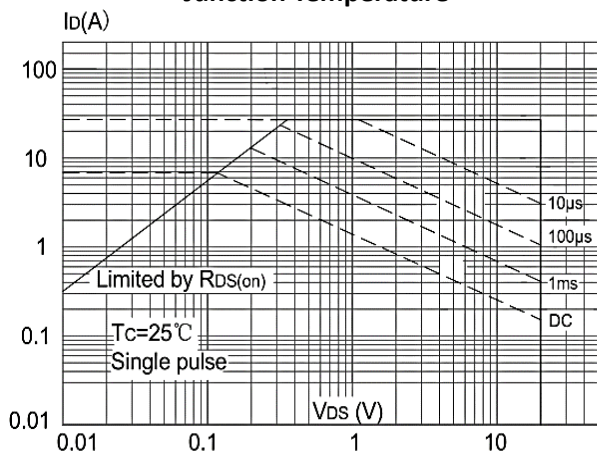


Figure 9: Maximum Safe Operating Area vs. Case Temperature

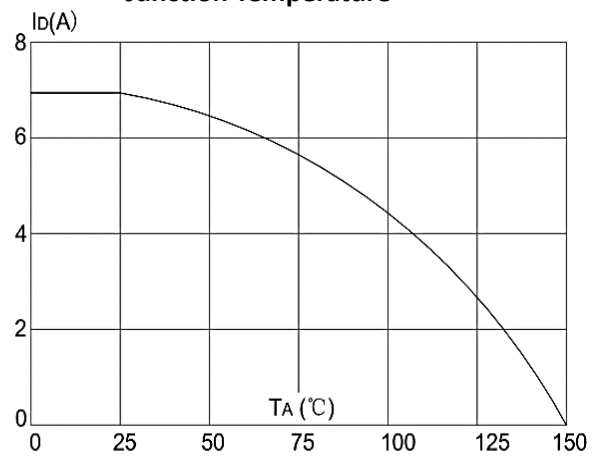


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

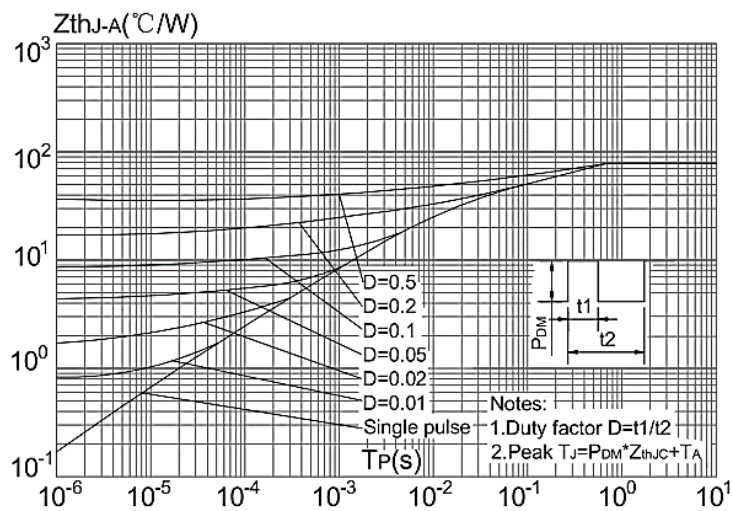
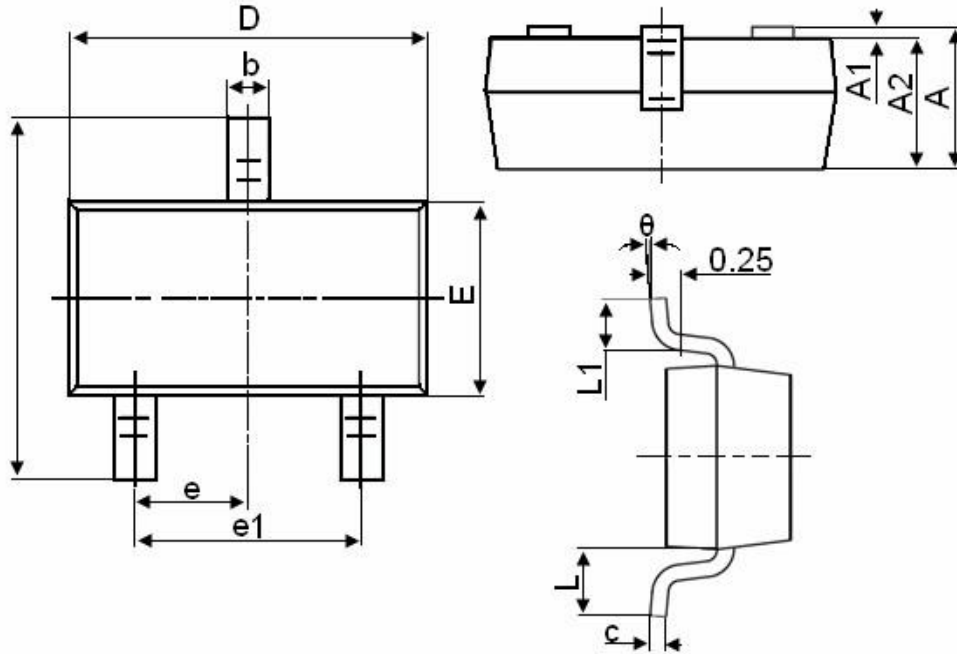


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

Package Mechanical Data:SOT-23



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°