Description

MOSFET

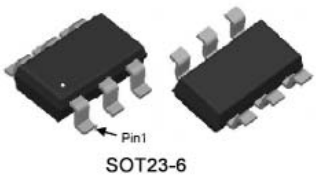
Features

- N-Channel: 20V 4A
  $R_{DS(ON)}$=38mΩ (Typ.) @ V_{GS}=4.5V
  $R_{DS(ON)}$=45mΩ (Typ.) @ V_{GS}=2.5V
- P-Channel: -20V -3A
  $R_{DS(ON)}$=64mΩ (Typ.) @ V_{GS}=-4.5V
  $R_{DS(ON)}$=82mΩ (Typ.) @ V_{GS}=-2.5V
- Low Reverse Transfer Capacitance
- Improved dv/dt Capability
- Fast Switching Speed

Application

- Battery Protection
- Load Switch
- Power Management

Package



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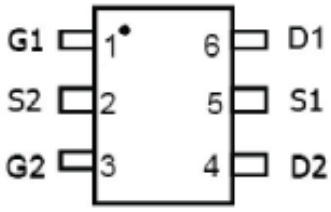
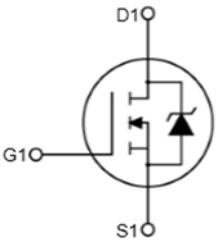
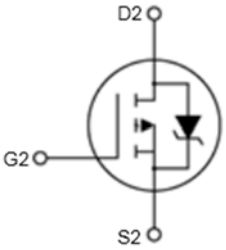


Pin Assignment



N-Channel



P-Channel

Absolute Maximum Ratings (T_C=25℃ unless otherwise specified)

Symbol	Parameter		Max. N-Channel	Max. P-Channel	Units
V_{DSS}	Drain-Source Voltage		20	-20	V
V_{GSS}	Gate-Source Voltage		±12	±12	V
I_D	Continuous Drain Current	T_C = 25℃	4.0	-3.2	A
		T_C = 100℃	3.0	-2.6	A
I_{DM}	Pulsed Drain Current note1		16	-12.8	A
P_D	Power Dissipation	T_C = 25℃	1.1		W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient		100		℃/W
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to +150		℃

N-Channel Electrical Characteristics (T_C=25℃ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	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, T_J= 25℃	-	-	1.0	μA
I_{GSS}	Gate to Body Leakage Current	V_{DS} =0V,V_{GS} = ±12V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}= V_{GS}, I_D=250μA	0.5	0.75	1.2	V
$R_{DS(on)}$	Static Drain-Source on-Resistance note2	V_{GS} =2.5V, I_D =2A	-	45	55	mΩ
		V_{GS} =4.5V, I_D =3A	-	38	48	mΩ
g_{FS}	Forward Transconductance	V_{DS} =5V, I_D =3A	-	5	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 10V, V_{GS} = 0V, f = 1.0MHz	-	240	-	pF
C_{oss}	Output Capacitance		-	45	-	pF
C_{rss}	Reverse Transfer Capacitance		-	23	-	pF
Q_g	Total Gate Charge	V_{DS} =10V, I_D =3A, V_{GS} = 4.5V	-	2.7	-	nC
Q_{gs}	Gate-Source Charge		-	0.4	-	nC
Q_{gd}	Gate-Drain(“Miller”) Charge		-	0.5	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{GEN}=4.5V, V_{DD}=10V, R_L =3.3Ω, R_{REN} =6Ω	-	2.3	-	ns
t_r	Turn-on Rise Time		-	3.1	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	21	-	ns
t_f	Turn-off Fall Time		-	2.6	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	4	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	16	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S=3A	-	0.75	1.16	V

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

2. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

N-Channel Typical Performance Characteristics

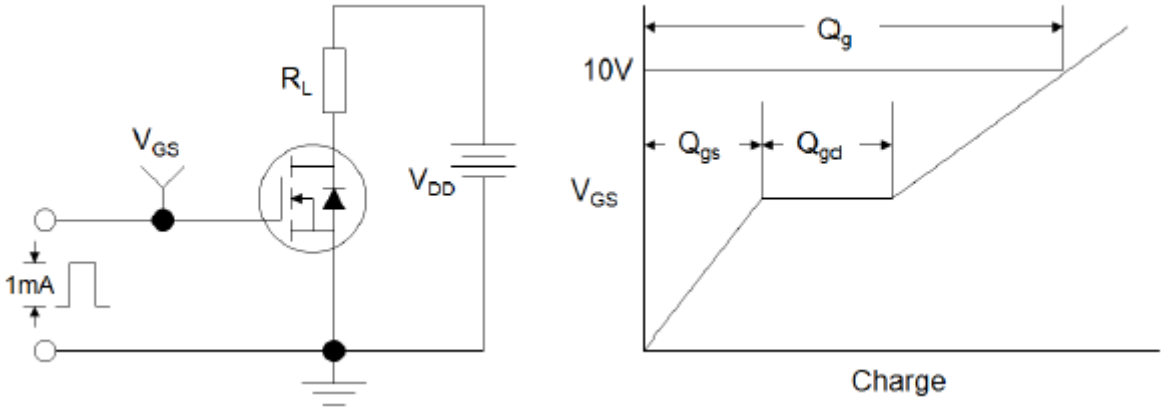


Figure1:Gate Charge Test Circuit & Waveform

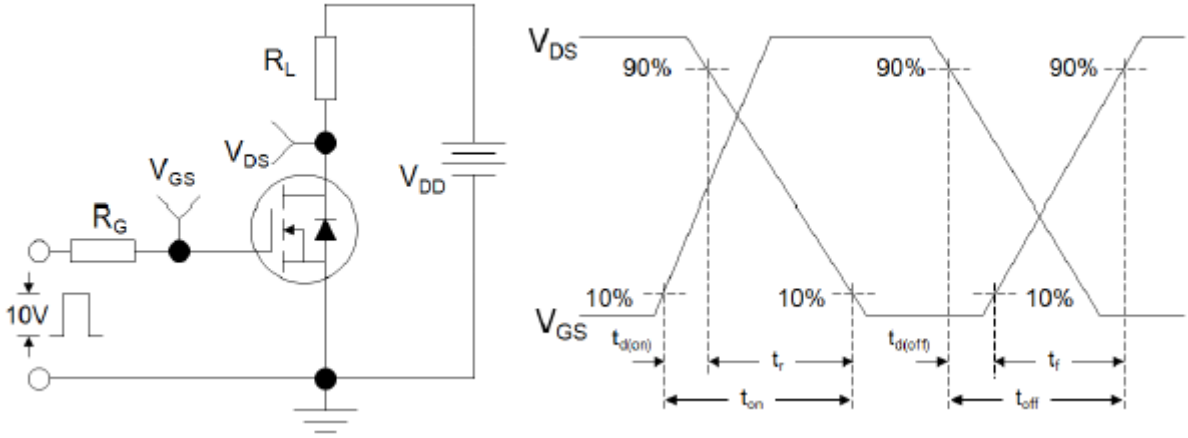


Figure 2: Resistive Switching Test Circuit & Waveforms

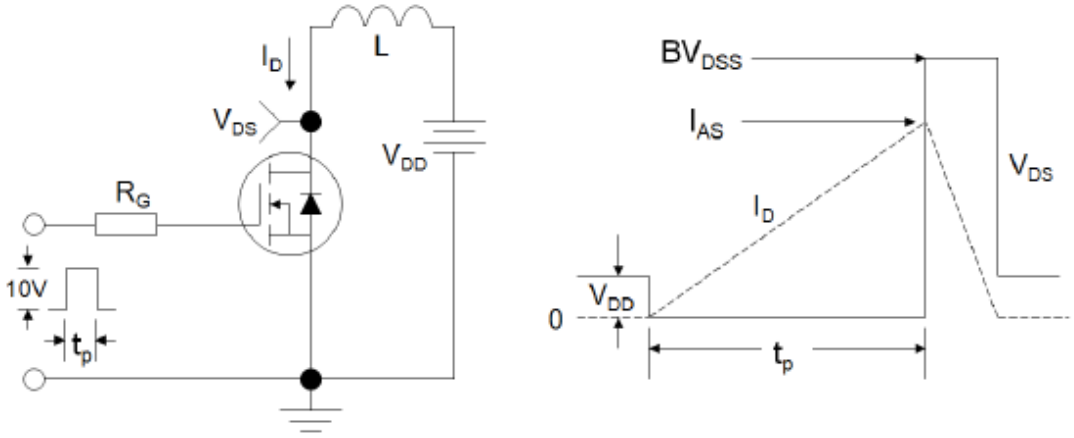


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

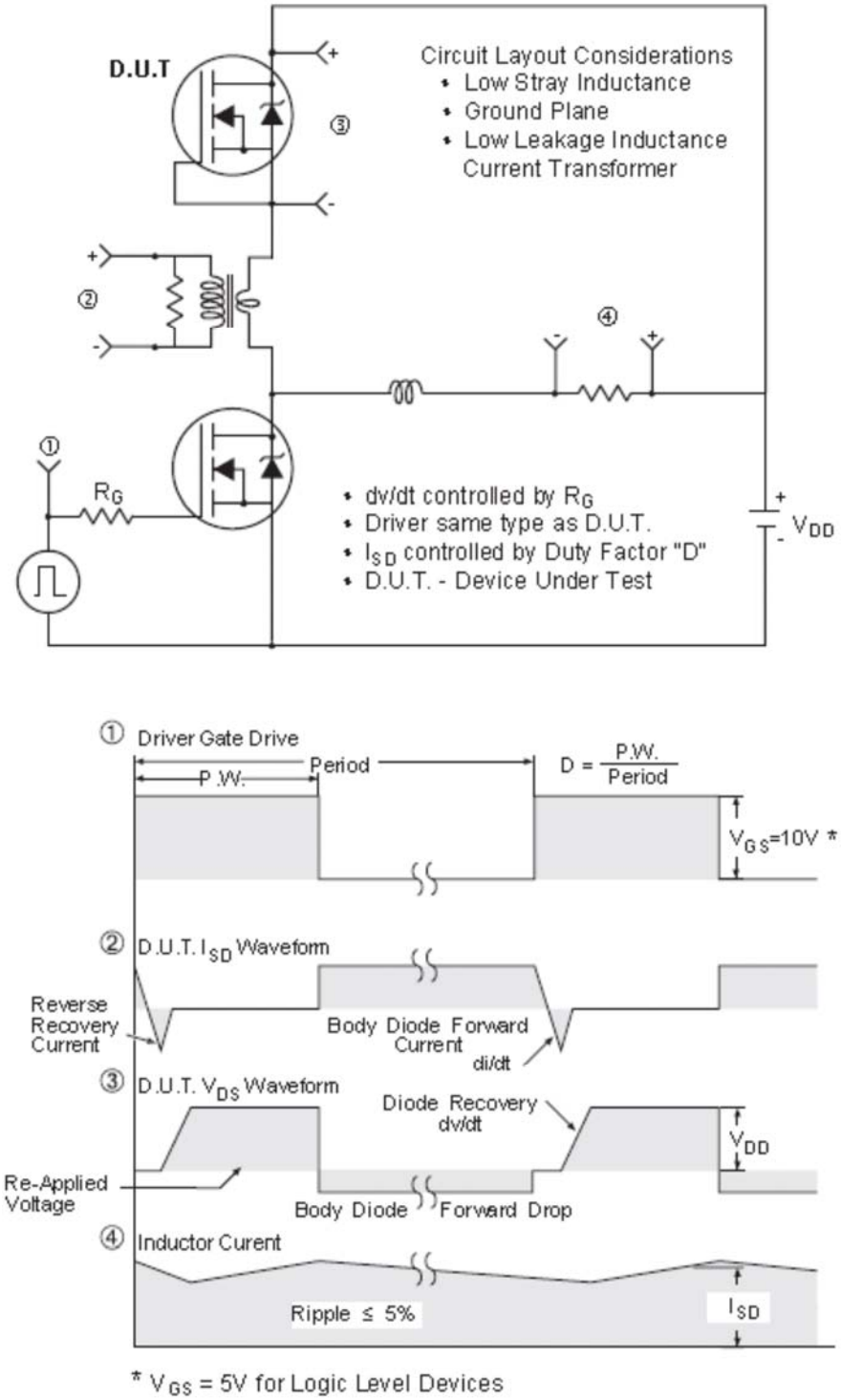


Figure 4:Peak Diode Recovery dv/dt Test Circuit & Waveforms (For N-channel)

P-Channel Electrical Characteristics (T_C=25℃ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
$V_{(BR)DSS}$	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 to Body Leakage Current	V_{DS} =0V, V_{GS} = ±12V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}= V_{GS}, I_D= -250μA	-0.4	-0.75	-1.2	V
$R_{DS(on)}$	Static Drain-Source on-Resistance note2	V_{GS} =-4.5V, I_D =-3A	-	64	80	mΩ
		V_{GS} =-2.5V, I_D =-2A	-	82	120	
g_{FS}	Forward Transconductance	V_{DS} =-5V, I_D = -5A	-	5	-	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = -10V, V_{GS} = 0V, f = 1.0MHz	-	561	-	pF
C_{oss}	Output Capacitance		-	61	-	pF
C_{rss}	Reverse Transfer Capacitance		-	52	-	pF
Q_g	Total Gate Charge	V_{DS} = -10V, I_D = -3A, V_{GS} = -4.5V	-	6.1	-	nC
Q_{gs}	Gate-Source Charge		-	1.7	-	nC
Q_{gd}	Gate-Drain(“Miller”) Charge		-	1.2	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD} = -10V, I_D = -2.8A, R_{GEN}=6Ω,V_{GE}=-4.5V, R_L=-10Ω	-	12.5	-	ns
t_r	Turn-on Rise Time		-	6.6	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	113	-	ns
t_f	Turn-off Fall Time		-	46.6	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-3.2	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-12.8	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S = -1.25A	-	-0.81	-1.2	V

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

2. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

P-Channel Typical Performance Characteristics

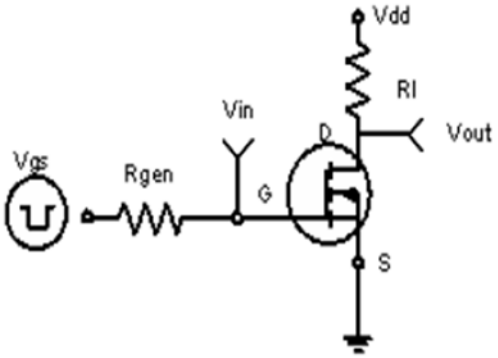


Figure1 :Switching Test Circuit

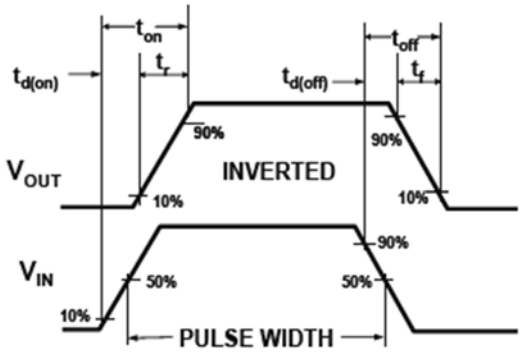
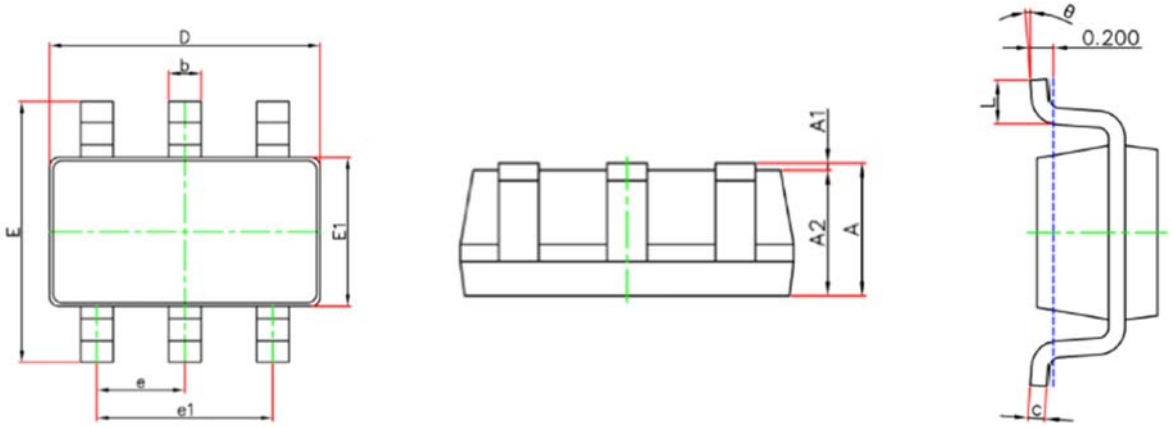


Figure2:Switching Waveforms

Package Mechanical Data



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950 (BSC)		0.037 (BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°