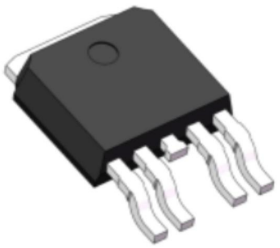
Features

- N-Channel: 40V, 34A
  $R_{DS(ON)}$ Typ = 14.7 mΩ @ V_{GS} = 10V
  $R_{DS(ON)}$ Typ = 20.5 mΩ @ V_{GS} = 4.5V
- P-Channel: -40V, -24A
  $R_{DS(ON)}$ Typ = 30 mΩ @ V_{GS} = -10V
  $R_{DS(ON)}$ Typ = 38 mΩ @ V_{GS} = -4.5V
- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge

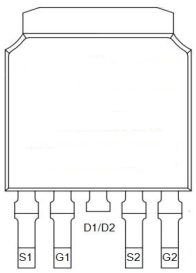


TO-252-4L

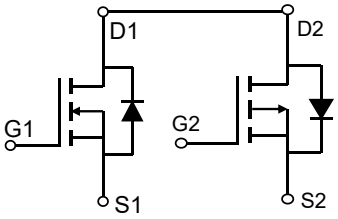
Applications

- Battery Protection
- Load Switch
- Power Management

100% UIS TESTED!
100% ΔVds TESTED!



Pin Assignment



Schematic Diagram

Absolute Maximum Ratings (@ T_J = 25°C unless otherwise specified)

Symbol	Parameter		N-Channel Value	P-Channel Value	Units
V_{DS}	Drain-to-Source Voltage		40	-40	V
V_{GS}	Gate-to-Source Voltage		±20	±20	V
I_D	Continuous Drain Current	T_C = 25°C	34	-24	A
		T_C = 100°C	20	-14	
I_{DM}	Pulsed Drain Current (1)		136	-96	A
E_{AS}	Single Pulsed Avalanche Energy (2)		49	49	mJ
P_D	Power Dissipation	T_C = 25°C	25	25	W
$R_{\theta JC}$	Thermal Resistance, Junction to Ambient		5.0	5.0	°C/W
T_J, T_{STG}	Junction & Storage Temperature Range		-55 to 150		°C

N-Channel Electrical Characteristics (T_J = 25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V	40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 40V, V_{GS} = 0V	-	-	1.0	μA
I_{GSS}	Gate-Body Leakage Current	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	1.0	1.5	2.2	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(3)	V_{GS} = 10V, I_D = 4A	-	14.7	21.0	mΩ
		V_{GS} = 4.5V, I_D = 3A	-	20.5	29.0	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 20V, f = 1MHz	-	841	-	pF
C_{oss}	Output Capacitance		-	54	-	pF
C_{rss}	Reverse Transfer Capacitance		-	47	-	pF
Q_g	Total Gate Charge	V_{GS} = 0 to 10V V_{DS} = 20V, I_D = 8A	-	12	-	nC
Q_{gs}	Gate Source Charge		-	3.2	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	3.1	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} = 10V, V_{DD} = 20V I_D= 8A, R_{GEN} = 3Ω	-	4	-	ns
t_r	Turn-On Rise Time		-	3	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	15	-	ns
t_f	Turn-Off Fall Time		-	2	-	ns
Drain-Source Diode Characteristics and Max Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	34	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	136	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S = 4A	-	-	1.2	V
trr	Body Diode Reverse Recovery Time	I_F = 8A, di/dt = 100A/us	-	7.8	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	3.9	-	nC

P-Channel Electrical Characteristics (T_J = 25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D = -250μA, V_{GS} = 0V	-40	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -40V, V_{GS} = 0V	-	-	-1.0	μA
I_{GSS}	Gate-Body Leakage Current	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = -250μA	-1.0	-1.5	-2.5	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(3)	V_{GS} = -10V, I_D = -3A	-	30	44	mΩ
		V_{GS} = -4.5V, I_D = -2A	-	38	59	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = -20V, f = 1MHz	-	715	-	pF
C_{oss}	Output Capacitance		-	67	-	pF
C_{rss}	Reverse Transfer Capacitance		-	55	-	pF
Q_g	Total Gate Charge	V_{GS} = 0 to -10V, V_{DS} = -20V, I_D = -2A	-	15	-	nC
Q_{gs}	Gate Source Charge		-	3.0	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	3.3	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} = -10V, V_{DD} = -20V, I_D= -2A, R_{GEN} = 6Ω	-	7	-	ns
t_r	Turn-On Rise Time		-	13	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	21	-	ns
t_f	Turn-Off Fall Time		-	7	-	ns
Drain-Source Diode Characteristics and Max Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-24	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-96	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S = -3A	-	-	-1.2	V
trr	Body Diode Reverse Recovery Time	I_F = -3A, di/dt = 100A/us	-	25	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	18	-	nC

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

2. E_{AS} condition: Starting T_J=25C, V_{DD}=15V, V_G=10V, R_G=25ohm, L=0.5mH, I_{AS}=14A

E_{AS} condition: Starting T_J=25C, V_{DD}=-15V, V_G=-10V, R_G=25ohm, L=0.5mH, I_{AS}=-14A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%.

Test Circuit

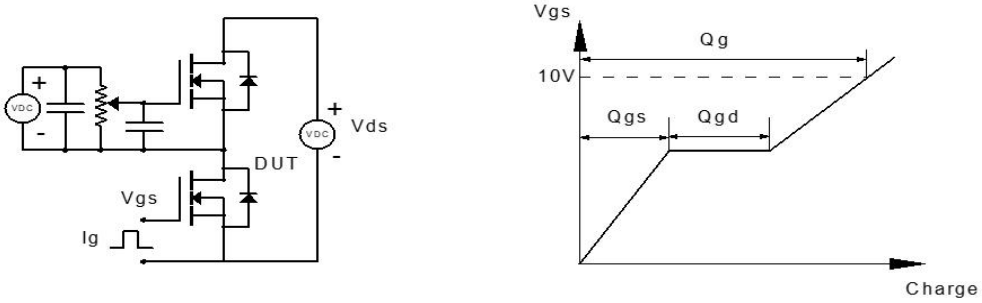


Figure 1: Gate Charge Test Circuit & Waveform

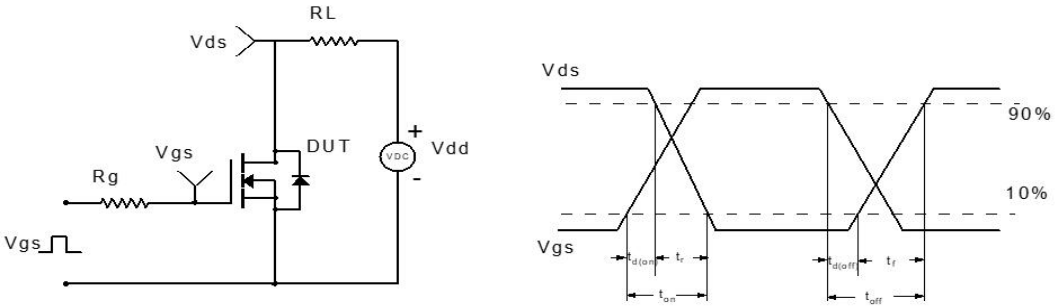


Figure 2: Resistive Switching Test Circuit & Waveform

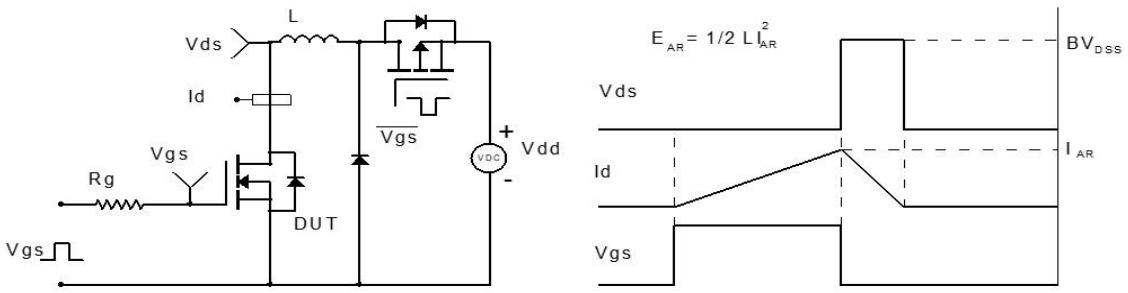


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

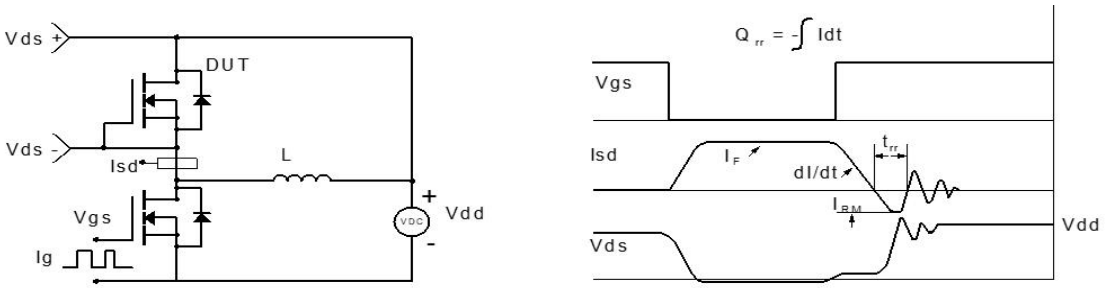
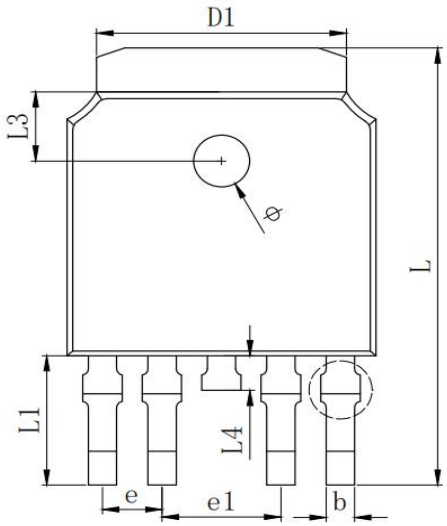
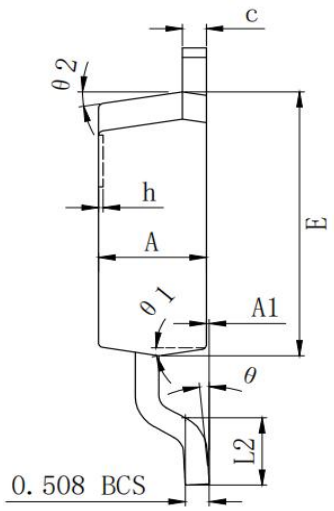
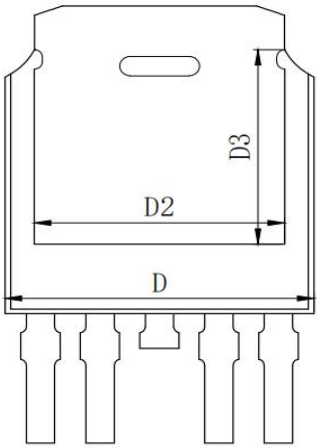


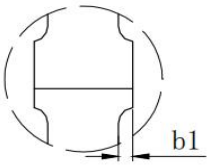
Figure 4: Diode Recovery Test Circuit & Waveform

Package Mechanical Data(TO-252-4L)









SYMBOL	MILLIMETER		
	MIN	Typ.	MAX
A	2.200	2.300	2.400
A1	0.000		0.127
b	0.550	0.600	0.650
b1	0.000		0.120
c(电镀后)	0.460	0.520	0.580
D	6.500	6.600	6.700
D1	5.334 REF		
D2	5.346 REF		
D3	4.490 REF		
E	6.000	6.100	6.200
e	1.270 TYP		
e1	2.540 TYP		
h	0.000	0.100	0.200
L	9.900	10.100	10.300
L1	2.988 REF		
L2	1.400	1.550	1.700
L3	1.600 REF		
L4	0.700	0.800	0.900
Φ	1.100	1.200	1.300
θ	0°		8°
θ1	9° TYP		
θ2	9° TYP		