SSF2341E

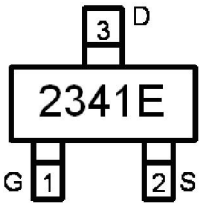
20V P-Channel MOSFET

Main Product Characteristics

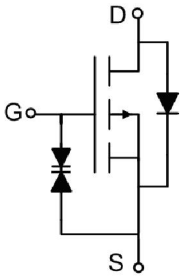
V_{DSS}	-20V
R_{DS}(on)	37mΩ (typ.)
I_D	-4A ①



SOT-23



Marking and Pin Assignment



Schematic Diagram

Features and Benefits

- Advanced MOSFET process technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 150℃ operating temperature
- Lead free product

Description

It utilizes the latest processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

Absolute Max Rating @T_A=25℃ unless otherwise specified

Symbol	Parameter	Max.	Units
I_D @ TC = 25°C	Continuous Drain Current, V_{GS} @ 10V	-4 ①	A
I_D @ TC = 70°C	Continuous Drain Current, V_{GS} @ 10V	-2.4 ①	
I_{DM}	Pulsed Drain Current ②	-30	
P_D @TC = 25°C	Power Dissipation ③	1.4	W
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-to-Source Voltage	± 8	V
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	°C

Thermal Resistance

Symbol	Characteristics	Typ.	Max.	Units
$R_{\theta JA}$	Junction-to-ambient (t ≤ 10s) ④	—	90	°C /W

Electrical Characteristics @T_A=25℃ unless otherwise specified

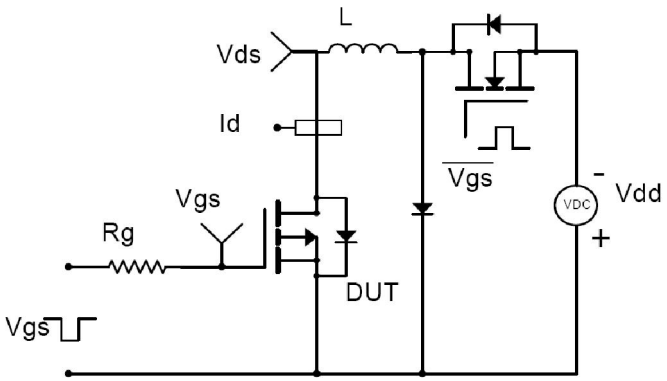
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source breakdown voltage	-20	—	—	V	V_{GS} = 0V, I_D = -250μA
$R_{DS(on)}$	Static Drain-to-Source on-resistance	—	37	43	mΩ	V_{GS}=-4.5V,I_D = -4A
		—	45	54		V_{GS}=-2.5V,I_D = -4A
		—	56	73		V_{GS}=-1.8V,I_D = -2A
$V_{GS(th)}$	Gate threshold voltage	-0.3	—	-1.0	V	V_{DS} = V_{GS}, I_D = -250μA
		—	-0.44	—		T_J = 125°C
I_{DSS}	Drain-to-Source leakage current	—	—	-1	μA	V_{DS} = -16V,V_{GS} = 0V
		—	—	-50		T_J = 125°C
I_{GSS}	Gate-to-Source forward leakage	—	—	10	μA	V_{GS} =8V
		—	—	-10		V_{GS} = -8V
Q_g	Total gate charge	—	10	—	nC	I_D = -4A,
Q_{gs}	Gate-to-Source charge	—	0.77	—		V_{DS}=-10V,
Q_{gd}	Gate-to-Drain("Miller") charge	—	3.5	—		V_{GS} = -4.5V
$t_{d(on)}$	Turn-on delay time	—	10	—	ns	V_{GS}=-4.5V, V_{DS} =-10V, R_{GEN}=3Ω,
t_r	Rise time	—	8.6	—		
$t_{d(off)}$	Turn-Off delay time	—	29	—		
t_f	Fall time	—	13	—		
C_{iss}	Input capacitance	—	939	—	pF	V_{GS} = 0V,
C_{oss}	Output capacitance	—	130	—		V_{DS} =-10V,
C_{rss}	Reverse transfer capacitance	—	111	—		f = 1MHz

Source-Drain Ratings and Characteristics

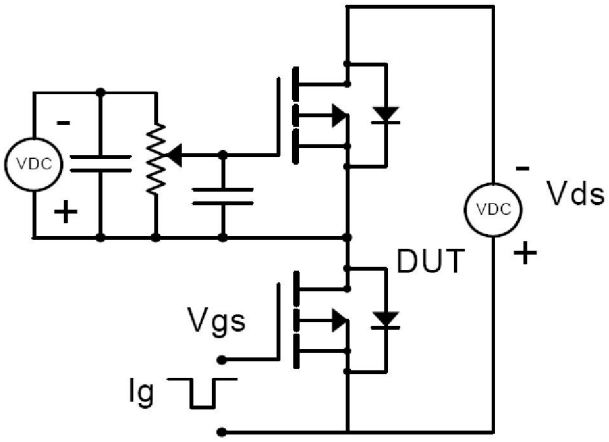
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	-4 ①	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode)	—	—	-30	A	
V_{SD}	Diode Forward Voltage	—	-0.76	-1.0	V	I_S=1A, V_{GS}=0V
trr	Reverse Recovery Time	—	8.7	—	ns	TJ = 25°C, IF =-4A, di/dt = 100A/μs
Qrr	Reverse Recovery Charge	—	2.3	—	nC	

Test Circuits and Waveforms

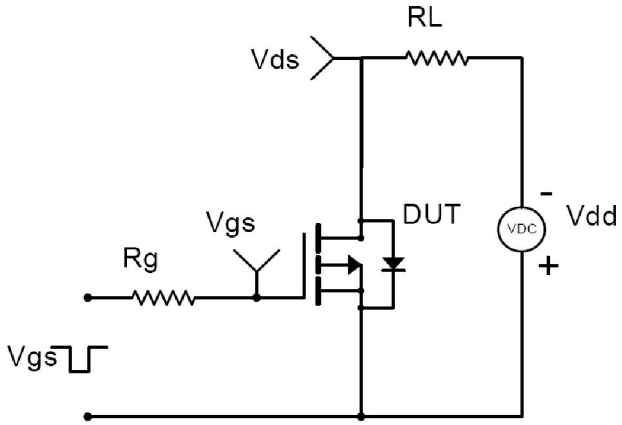
EAS test circuit:



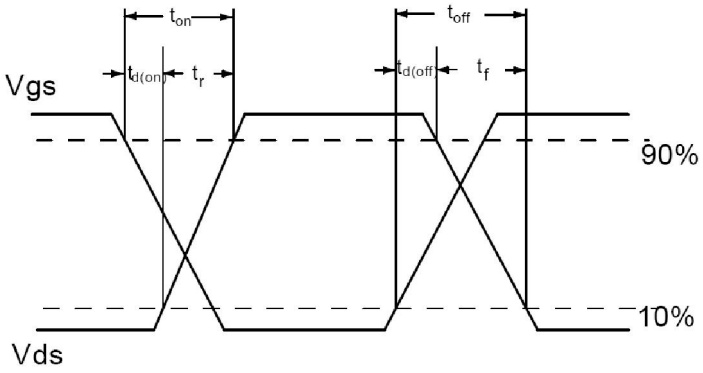
Gate charge test circuit:



Switching time test circuit:



Switch Waveforms:



Notes:

①Calculated continuous current based on maximum allowable junction temperature.
②Repetitive rating; pulse width limited by max. junction temperature.
③The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.
④The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with TA =25°C

Typical Electrical and Thermal Characteristics

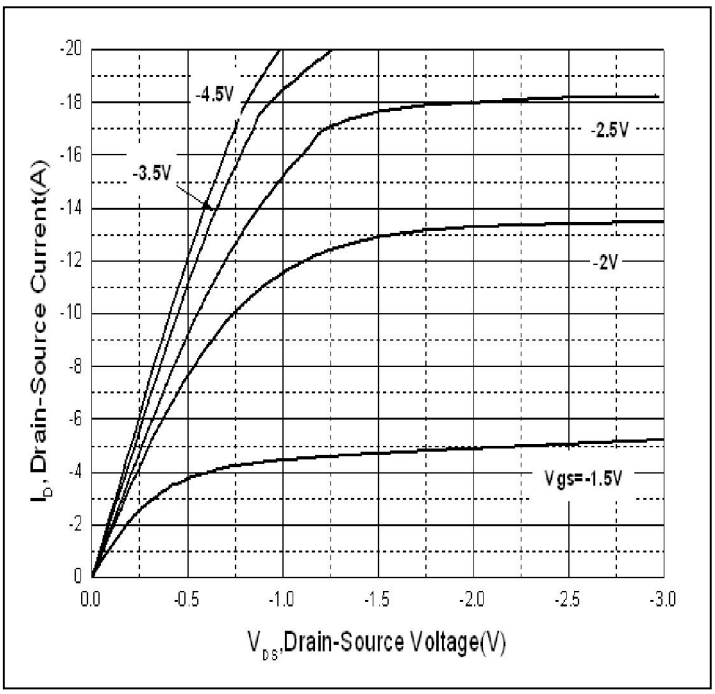


Figure 1: Typical Output Characteristics

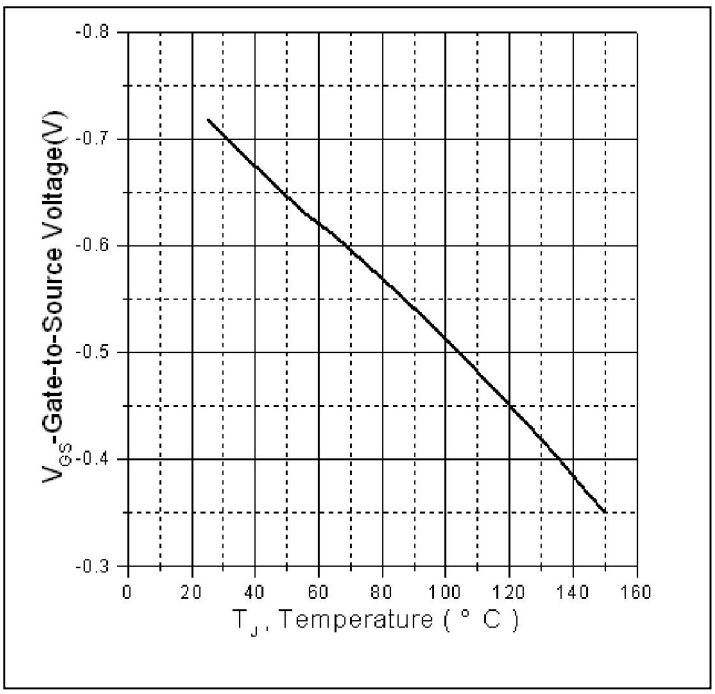


Figure 2. Gate to source cut-off voltage

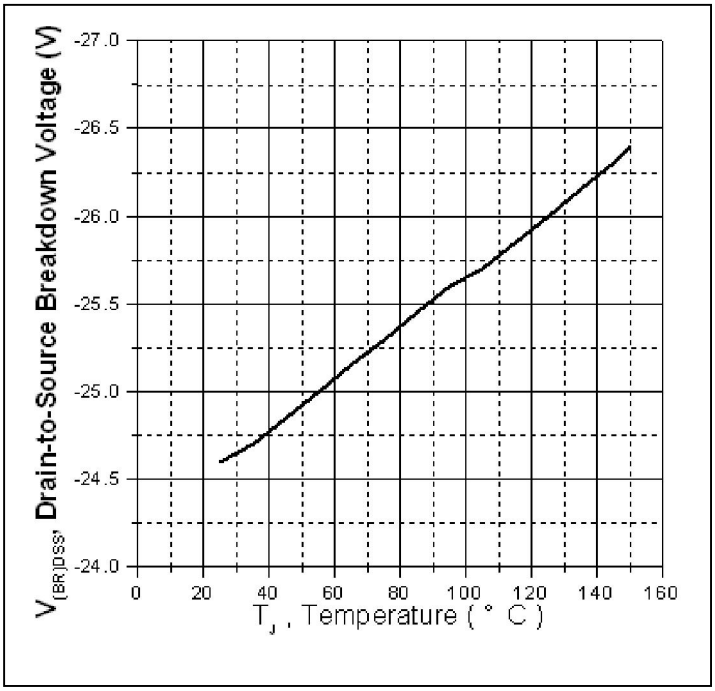


Figure 3. Drain-to-Source Breakdown Voltage Vs. Case Temperature

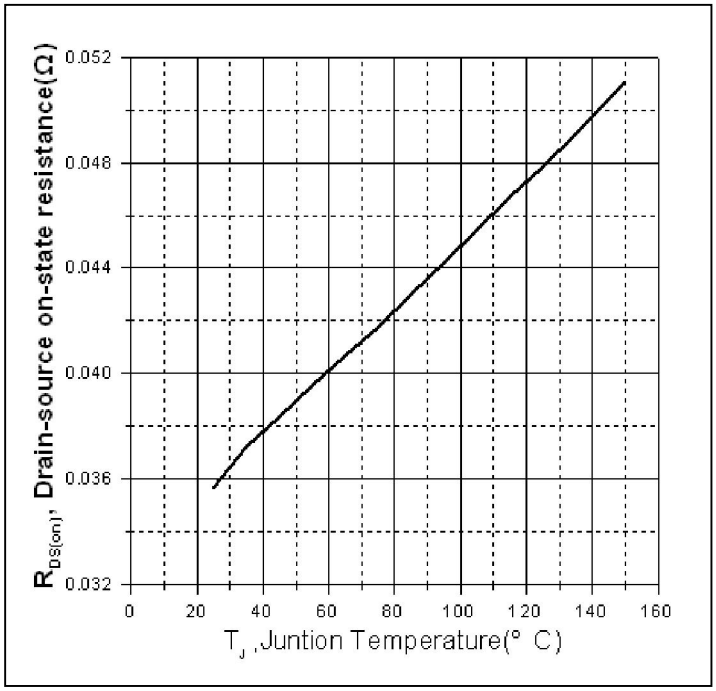


Figure 4: Normalized On-Resistance Vs. Case Temperature

Typical Electrical and Thermal Characteristics

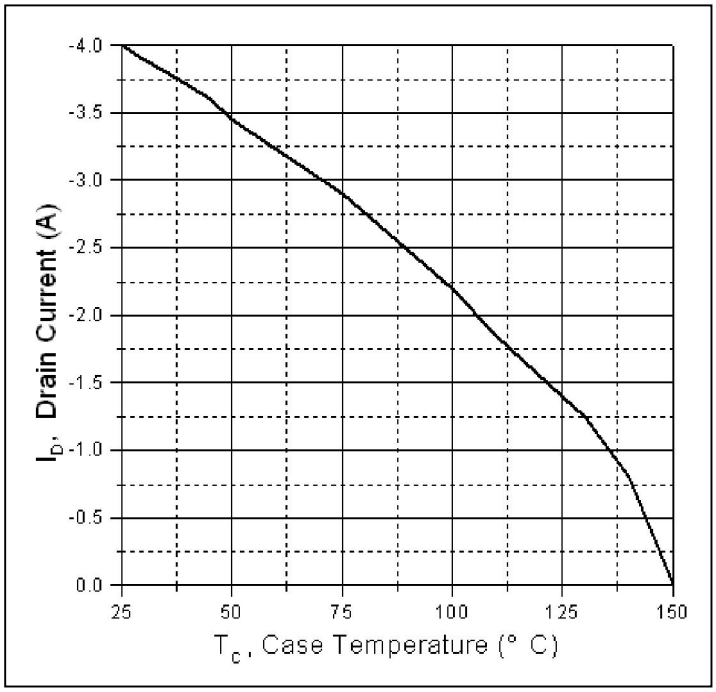


Figure 5. Maximum Drain Current Vs. Case Temperature

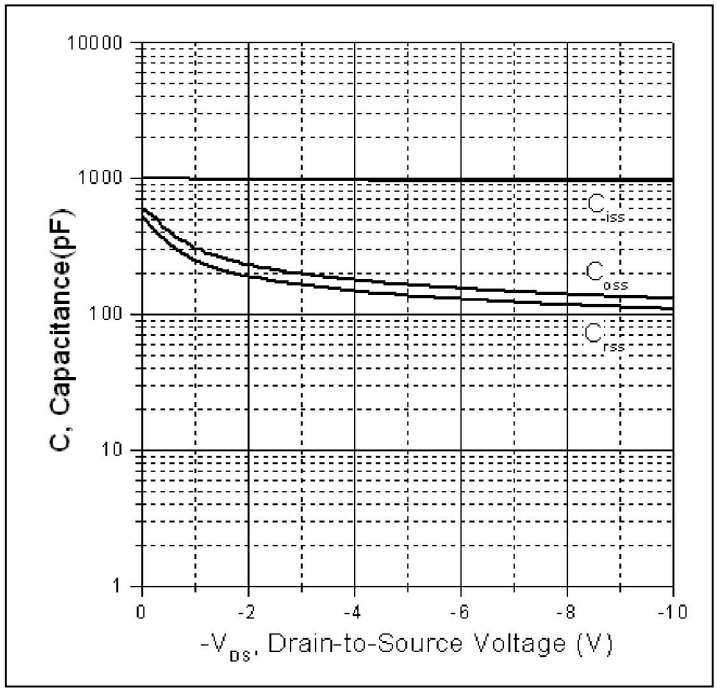


Figure 6. Typical Capacitance Vs. Drain-to-Source Voltage

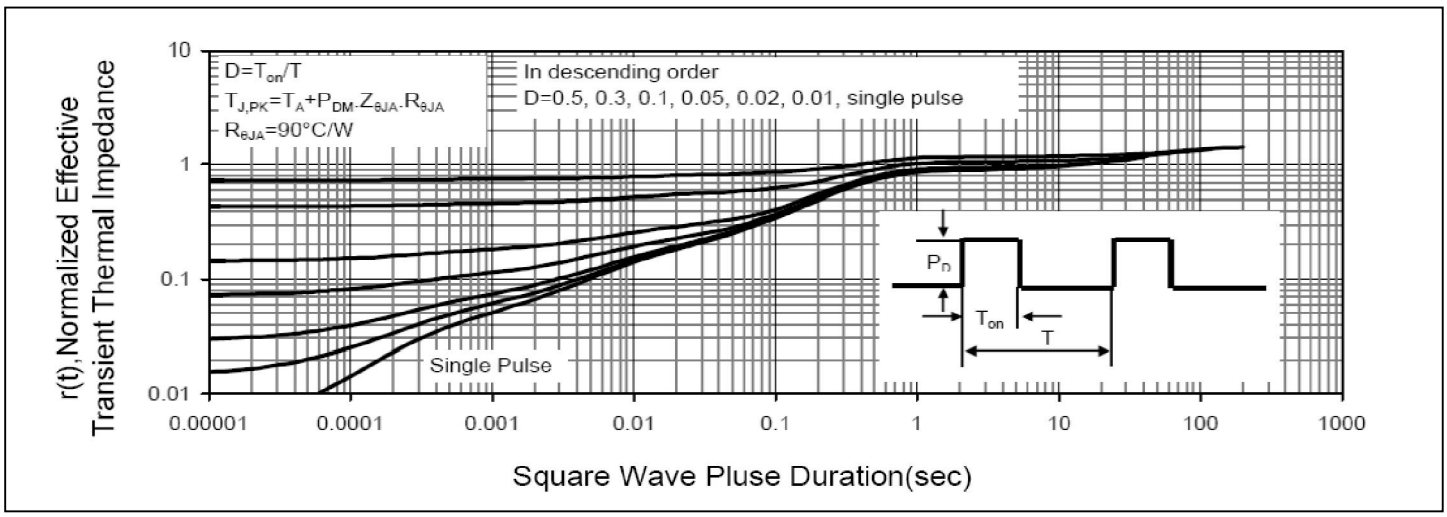
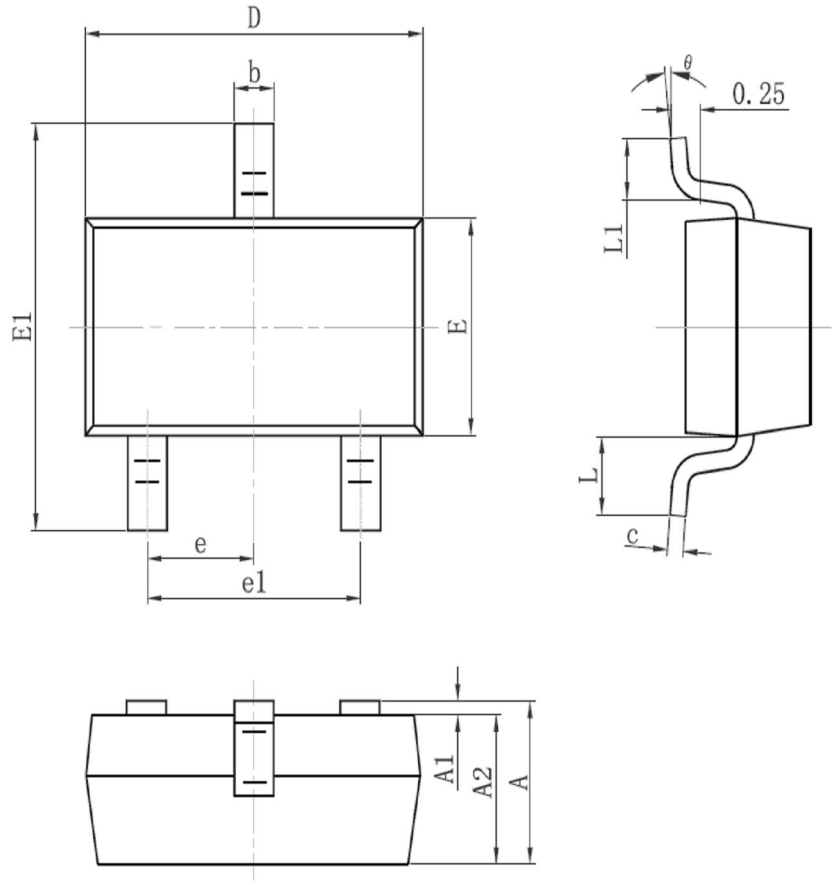


Figure7. Maximum Effective Transient Thermal Impedance Junction-to-Case

Mechanical Data



Ordering and Marking Information

Device Marking: 2341E

Package (Available)
SOT-23
Operating Temperature Range
C : -55 to 150 °C

Devices per Unit

Package Type	Units/ Tape	Tapes/Inner Box	Units/Inner Box	Inner Boxes/Carton Box	Units/Carton Box
SOT23	3000	10	30000	4	120000

Reliability Test Program

Test Item	Conditions	Duration	Sample Size
High Temperature Reverse Bias(HTRB)	Tj=125℃ to 150℃ @ 80% of Max $V_{DSS}/V_{CES}/V_R$	168 hours 500 hours 1000 hours	3 lots x 77 devices
High Temperature Gate Bias(HTGB)	Tj=150℃@ 100% of Max V_{GSS}	168 hours 500 hours 1000 hours	3 lots x 77 devices