P-Channel Trench Power MOSFET

General Description

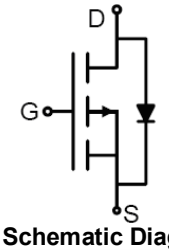
The CS3401 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as -2.5V. This device is suitable for use as a load switch or in PWM applications.

Features

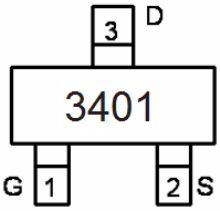
- V_{DS} = -30V,ID =-4.2A
  $R_{DS(ON)}$ < 55mΩ @ V_{GS} =-10V
  $R_{DS(ON)}$ < 65mΩ @ V_{GS} =-4.5V
  $R_{DS(ON)}$ < 110mΩ @ V_{GS} =-2.5V
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

Application

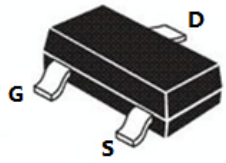
- PWM applications
- Load switch
- Power management



Schematic Diagram



Marking and pin Assignment



SOT-23-3L top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
3401	CS3401	SOT-23-3L	Ø180mm	8mm	3000 units

Table 1. Absolute Maximum Ratings (T_A=25℃)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage (V_{GS}=0V）	-30	V
V_{GS}	Gate-Source Voltage (V_{DS}=0V)	±12	V
I_D	Drain Current-Continuous	-4.2	A
$I_{DM\ (pluse)}$	Drain Current-Continuous@ Current-Pulsed **(Note 1)**	-30	A
P_D	Maximum Power Dissipation	1.5	W
T_J,T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150	℃

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature

Table 2. Thermal Characteristic

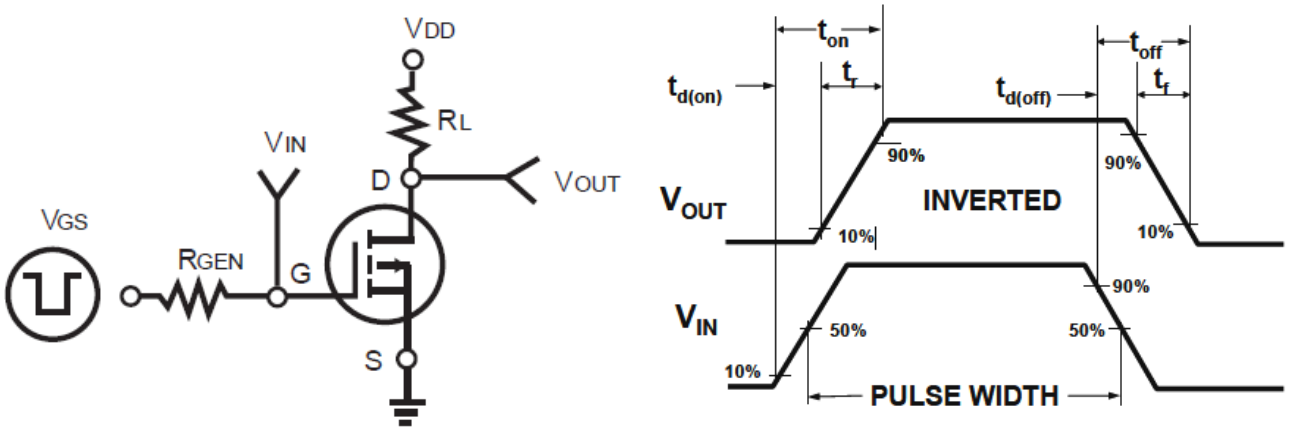
Symbol	Parameter	Value	Unit
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	85	℃/W

Table 3. Electrical Characteristics (T_A=25℃unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=-250μA	-30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-24V,V_{GS}=0V			1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±12V,V_{DS}=0V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=-250μA	-0.6	-0.9	-1.4	V
g_{FS}	Forward Transconductance	V_{DS}=-5V,I_D=-4.2A		11		S
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=-10V, I_D=-4.2A		40	55	mΩ
		V_{GS}=-4.5V, I_D=-4A		48	65	mΩ
		V_{GS}=-2.5V, I_D=-2A		65	110	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=-15V,V_{GS}=0V, f=1.0MHz		680		pF
C_{oss}	Output Capacitance			105		pF
C_{rss}	Reverse Transfer Capacitance			68		pF
Switching Times						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=-15V,I_D=-1A,R_L=15Ω V_{GS}=-10V,R_G=2.5Ω		5		nS
t_r	Turn-on Rise Time			6		nS
$t_{d(off)}$	Turn-Off Delay Time			28		nS
t_f	Turn-Off Fall Time			7		nS
Q_g	Total Gate Charge	V_{DS}=-15V,I_D=-4.2A, V_{GS}=-10V		10		nC
Q_{gs}	Gate-Source Charge			2		nC
Q_{gd}	Gate-Drain Charge			3		nC
Source-Drain Diode Characteristics						
I_{SD}	Source-Drain Current(Body Diode)				-4.2	A
V_{SD}	Forward on Voltage **(Note 1)**	V_{GS}=0V,I_S=-1A		-0.78	-1.2	V

Notes 1. Repetitive Rating: Pulse width limited by maximum junction temperature.

Switch Time Test Circuit and Switching Waveforms:



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

Figure1. Power Dissipation

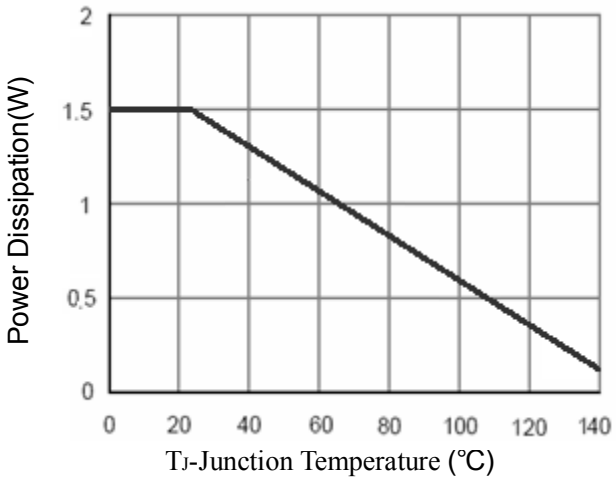


Figure2. Drain Current

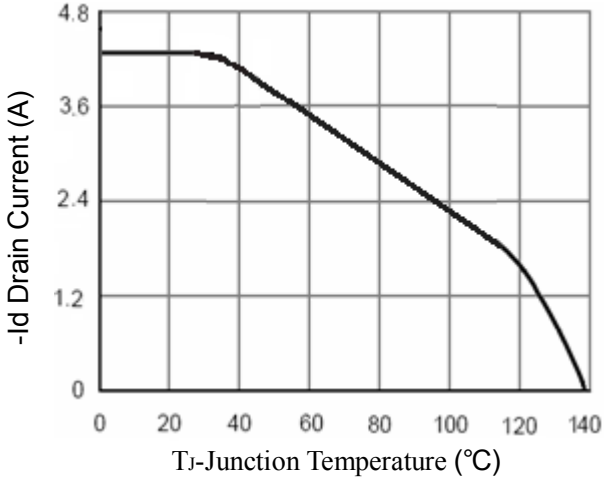


Figure3. Output Characteristics

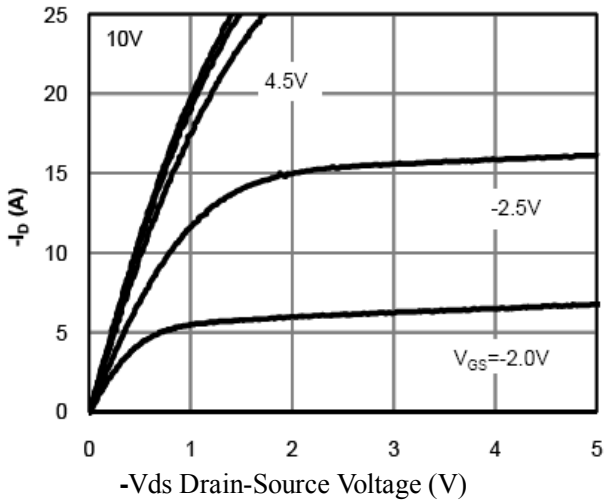


Figure4. Transfer Characteristics

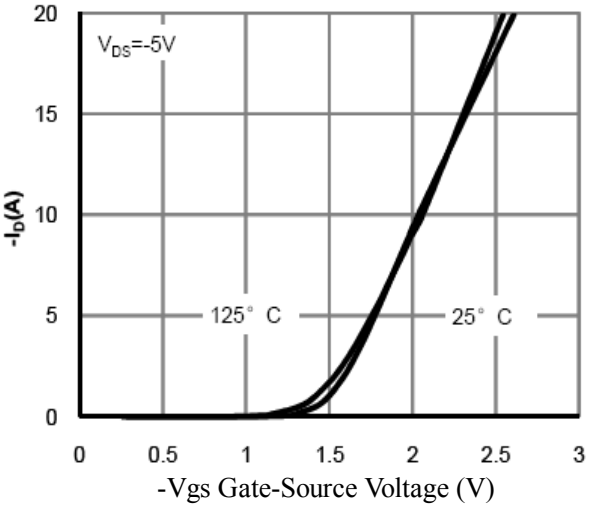


Figure5. Capacitance

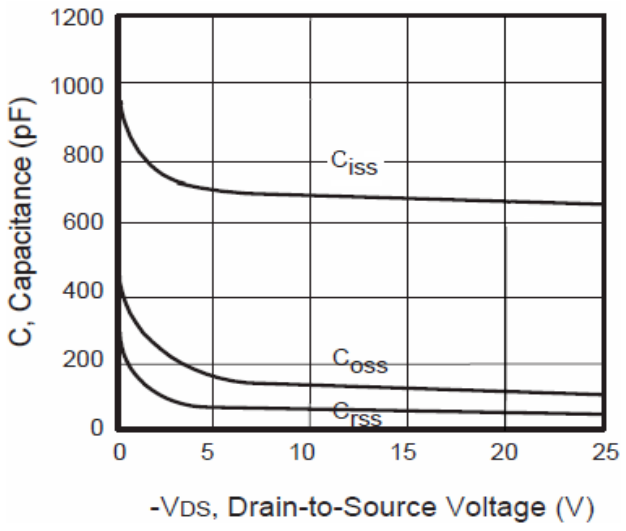


Figure6. $R_{DS(ON)}$ vs Junction Temperature

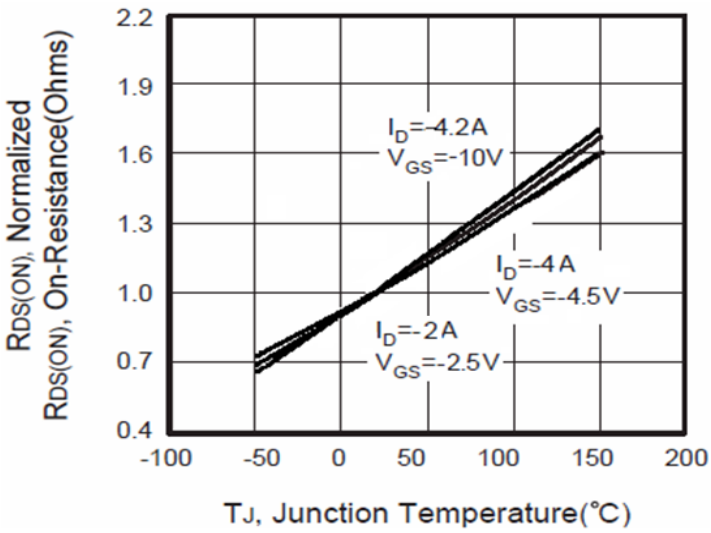


Figure7. Max BV_{DSS} vs Junction Temperature

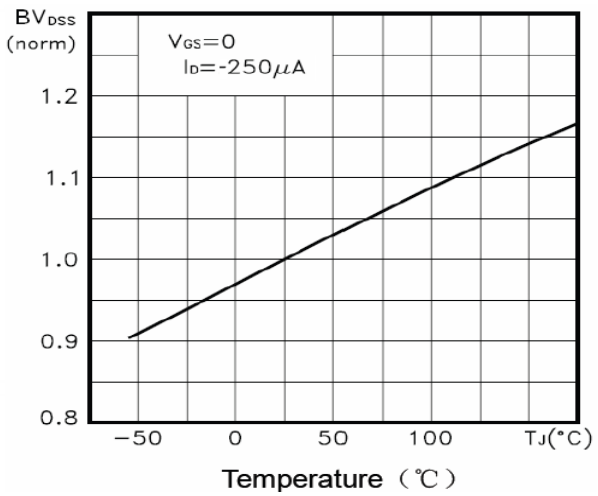


Figure8. $V_{GS(th)}$ vs Junction Temperature

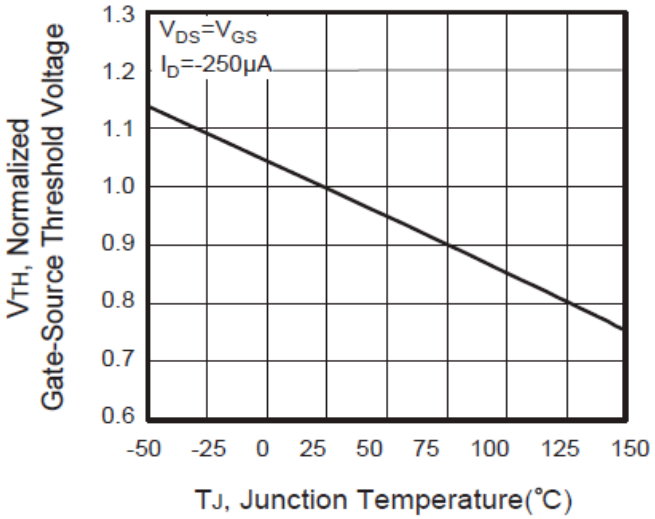


Figure9. Gate Charge Waveforms

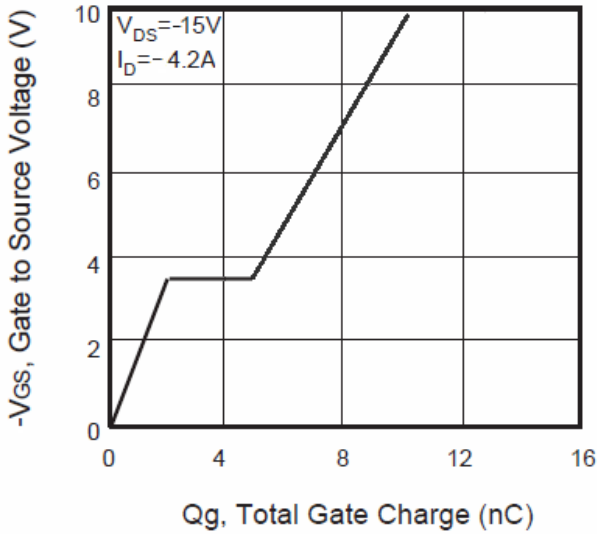


Figure10. Maximum Safe Operating Area

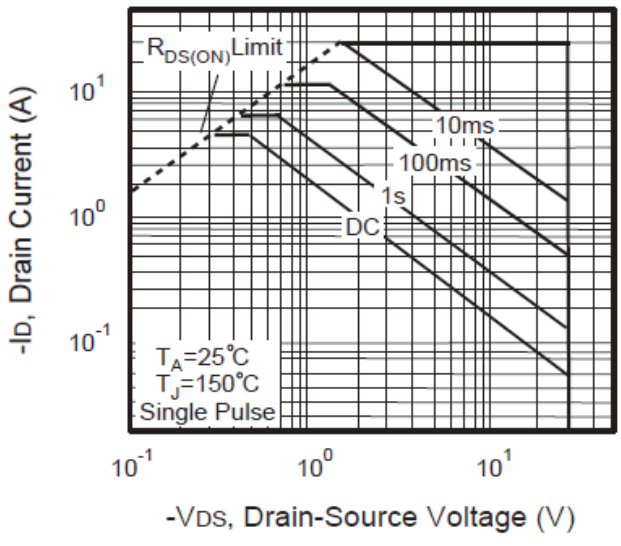
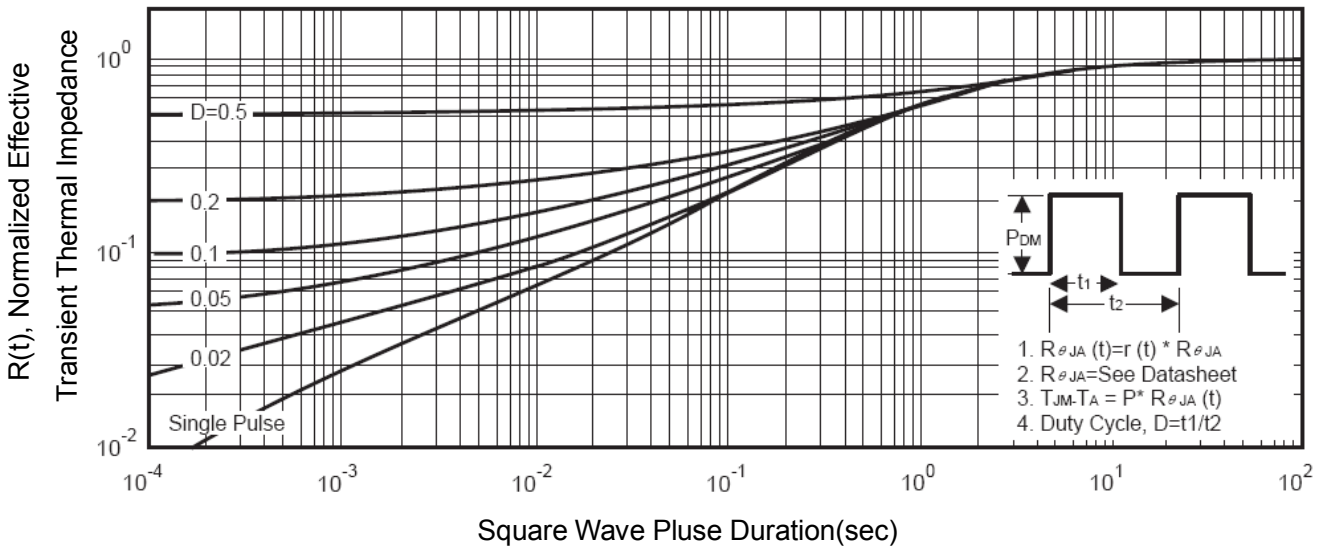


Figure11. Normalized Maximum Transient Thermal Impedance



SOT23-3 Package Information