

- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology
- ★ 100% EAS Guaranteed

## Product Summary

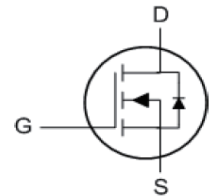
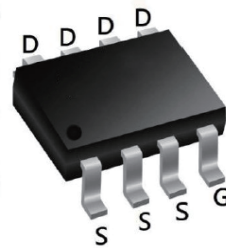
BVDSS	RDS(ON)	ID
30V	7mΩ	18A

## Description

The 4410 is the high cell density trenched N-ch MOSFETs, which provide excellent RDS(ON) and gate charge for most of the synchronous buck converter applications.

The 4410 meet the RoHS and Green Product, requirement 100% EAS guaranteed with full function reliability approved.

## SOP8 Pin Configuration



## Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	±20	V
$I_{D@T_A=25^{\circ}C}$	Continuous Drain Current, $V_{GS}$ @ 10V <sup>1</sup>	18	A
$I_{D@T_A=70^{\circ}C}$	Continuous Drain Current, $V_{GS}$ @ 10V <sup>1</sup>	10	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	60	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	40	mJ
$I_{AS}$	Avalanche Current	35	A
$P_D@T_A=25^{\circ}C$	Total Power Dissipation <sup>4</sup>	5	W
$T_{STG}$	Storage Temperature Range	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	°C

## Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	---	41	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	10	°C/W

**Electrical Characteristics (T<sub>J</sub> =25 °C unless otherwise specified)**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>b</sub> =250μA	30	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =30V, V <sub>GS</sub> = 0V,	-	-	1	μA
I <sub>GSS</sub>	Gate to Body Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±20V	-	-	±100	nA
<b>On Characteristics</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>b</sub> =250μA	1	1.5	2.5	V
R <sub>DS(on)</sub>	Static Drain-Source on-Resistance note <sup>3</sup>	V <sub>GS</sub> =10V, I <sub>b</sub> =15A	-	7	9	mΩ
		V <sub>GS</sub> =4.5V, I <sub>b</sub> =10A	-	11	14	
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1.0MHz	-	1116	-	pF
C <sub>oss</sub>	Output Capacitance		-	187	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	152	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =15V, I <sub>b</sub> =8A, V <sub>GS</sub> =10V	-	13.3	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	3.1	-	nC
Q <sub>gd</sub>	Gate-Drain( "Miller" ) Charge		-	5	-	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DS</sub> =15V, I <sub>b</sub> =15A, V <sub>GS</sub> =10V, R <sub>REN</sub> =3Ω	-	15	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	19	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time		-	35	-	ns
t <sub>f</sub>	Turn-off Fall Time		-	21	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Maximum Continuous Drain to Source Diode Forward Current		-	-	15	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		-	-	60	A
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =15A	-	-	1.2	V
t <sub>rr</sub>	Body Diode Reverse Recovery Time	I <sub>F</sub> =5A, dI/dt=100A/μs	-	14	-	ns
Q <sub>rr</sub>	Body Diode Reverse Recovery Time Charge		-	4.1	-	nC

**Note :**

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: T<sub>J</sub>=25°C, V<sub>GS</sub>=15V, R<sub>G</sub>=25Ω, L=0.5mH, I<sub>AS</sub>=12.6A
3. Pulse Test: Pulse Width ≤300μs, Duty Cycle ≤0.5%

Typical Performance Characteristics

Figure 1: Output Characteristics

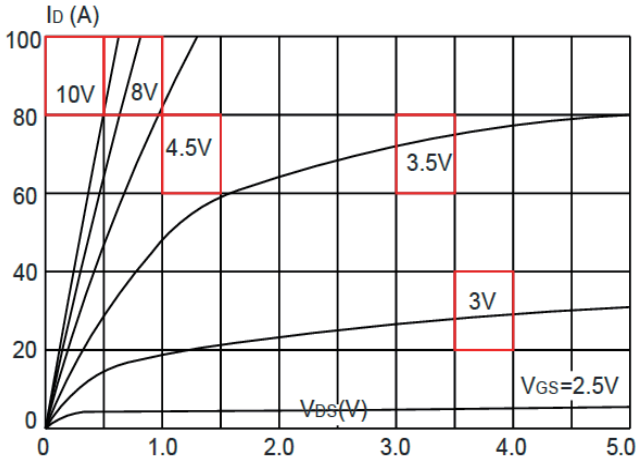


Figure 2: Typical Transfer Characteristics

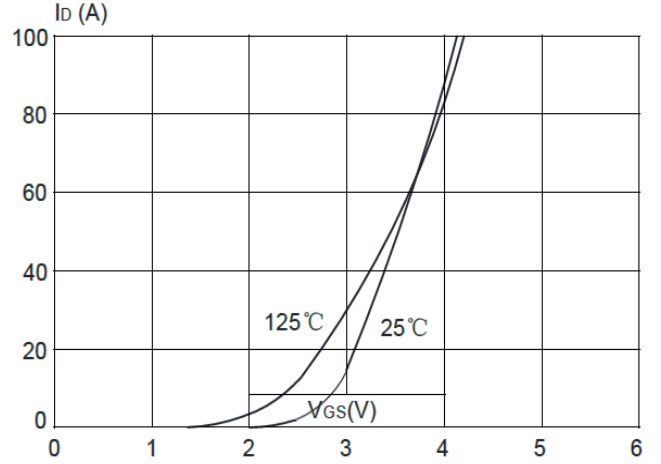


Figure 3: On-resistance vs. Drain Current

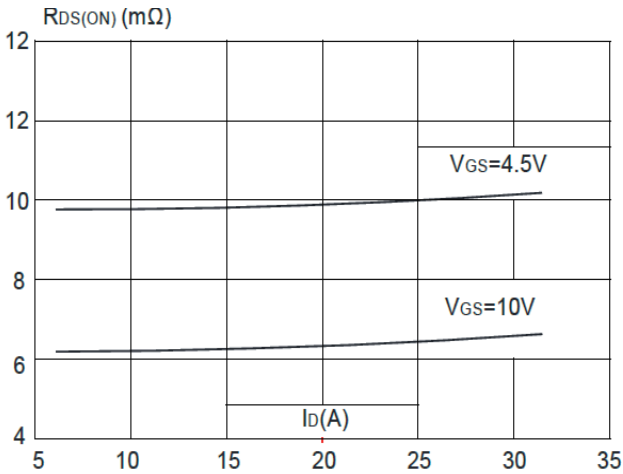


Figure 4: Body Diode Characteristics

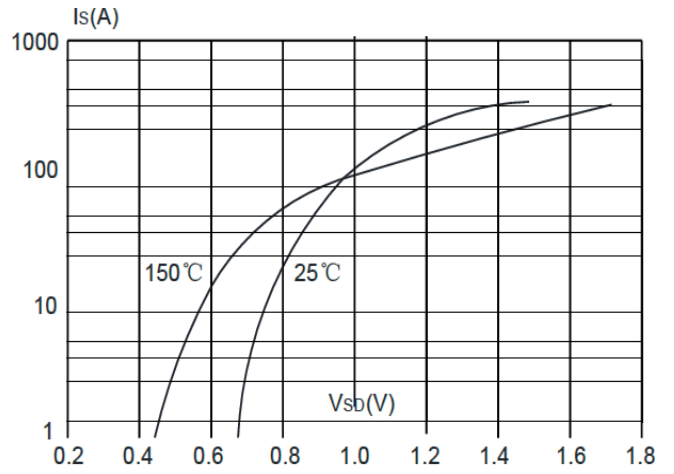


Figure 5: Gate Charge Characteristics

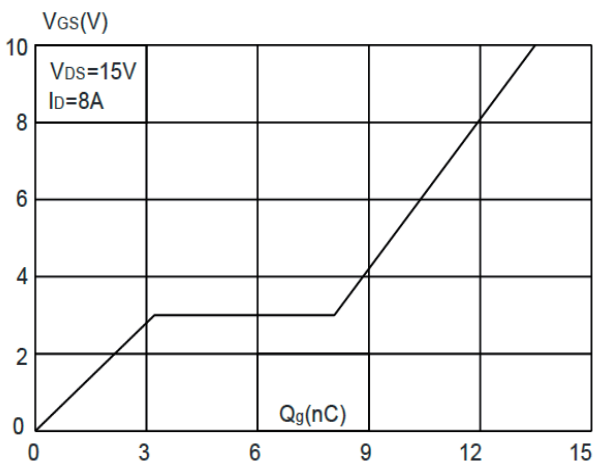
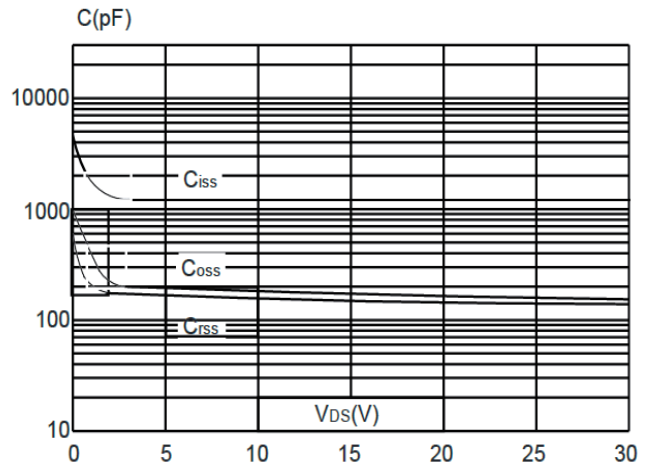


Figure 6: Capacitance Characteristics



## Typical Performance Characteristics

Figure 7: Normalized Breakdown Voltage

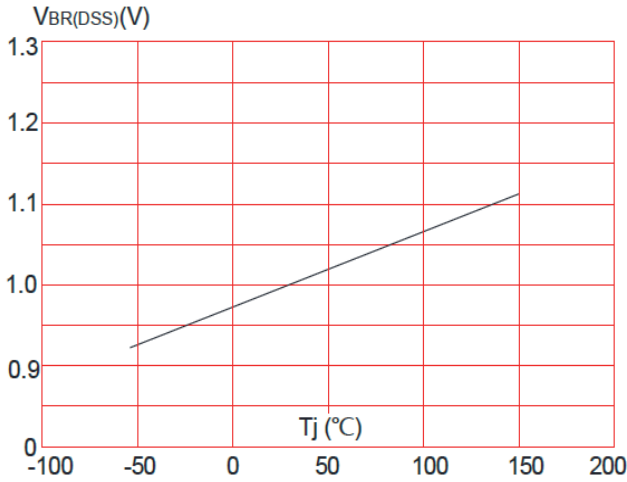


Figure 8: Normalized on Resistance vs. Junction Temperature

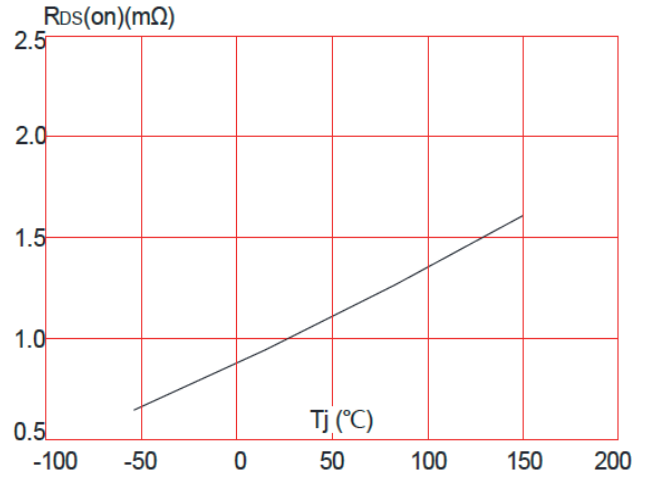


Figure 9: Maximum Safe Operating Area

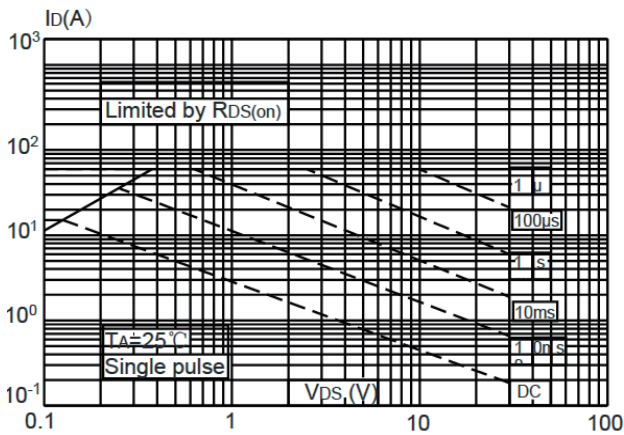


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

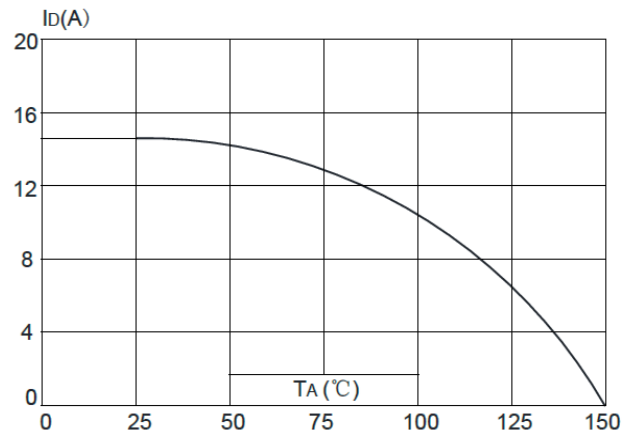
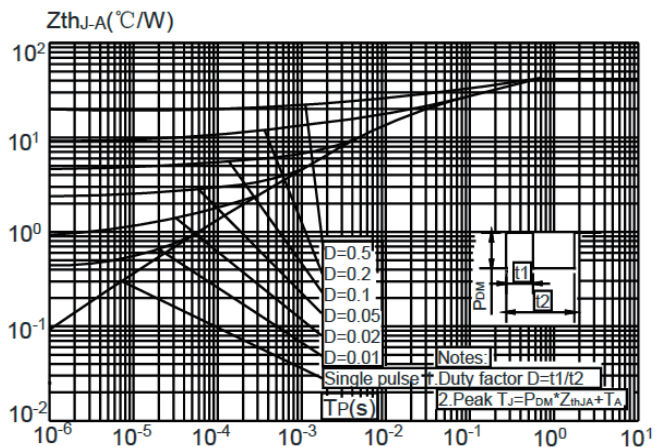
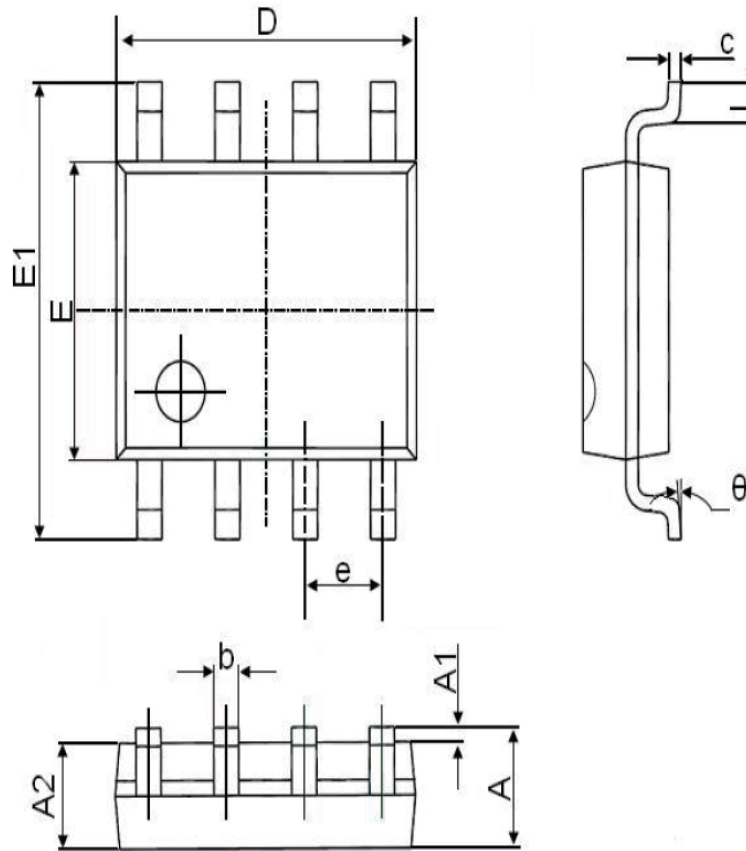


Figure 11: Maximum Effective Transient Thermal Impedance



SOP-8 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.35	1.75	0.053	0.069
A1	0.1	0.25	0.004	0.01
A2	1.35	1.55	0.053	0.061
b	0.33	0.51	0.013	0.02
c	0.17	0.25	0.006	0.01
D	4.7	5.1	0.185	0.2
E	3.8	4	0.15	0.157
E1	5.8	6.2	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.4	1.27	0.016	0.05
$\theta$	0°	8°	0°	8°