

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

Product Summary



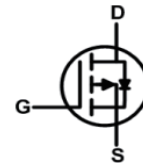
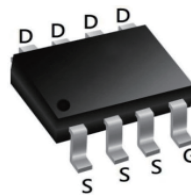
BVDSS	RDSON	ID
-30V	9.5mΩ	-12A

Description

The 4407A is the high cell density trenched P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The 4407A meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

SOP8 Pin Configuration



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

Symbol	Parameter	Rating	Units
V <sub>DS</sub>	Drain-Source Voltage	-30	V
V <sub>GS</sub>	Gate-Source Voltage	±20	V
I <sub>D</sub> @T <sub>A</sub> =25°C	Continuous Drain Current, V <sub>GS</sub> @ -10V <sup>1</sup>	-12	A
I <sub>D</sub> @T <sub>A</sub> =70°C	Continuous Drain Current, V <sub>GS</sub> @ -10V <sup>1</sup>	-9	A
I <sub>DM</sub>	Pulsed Drain Current <sup>2</sup>	-46	A
E <sub>AS</sub>	Single Pulse Avalanche Energy <sup>3</sup>	55	mJ
I <sub>AS</sub>	Avalanche Current	-50	A
P <sub>D</sub> @T <sub>A</sub> =25°C	Total Power Dissipation <sup>4</sup>	4.5	W
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction-Ambient <sup>1</sup>	---	75	°C/W
	Thermal Resistance Junction-Ambient <sup>1</sup> (t≤10s)	---	40	°C/W
R <sub>θJC</sub>	Thermal Resistance Junction-Case <sup>1</sup>	---	24	°C/W

**Electrical Characteristics ( $T_J = 25^\circ\text{C}$  unless otherwise specified)**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D = -250 \mu A$	-30	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = -30V, V_{GS} = 0V,$	-	-	-1	$\mu A$
$I_{GSS}$	Gate to Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 20V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250 \mu A$	-1	-1.6	-2.5	V
$R_{DS(on)}$	Static Drain-Source on-Resistance Note3	$V_{GS} = -10V, I_D = -10A$	-	9.5	14	m $\Omega$
		$V_{GS} = -4.5V, I_D = -5A$	-	17	24	
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS} = -15V, V_{GS} = 0V, f = 1.0MHz$	-	1770	-	pF
$C_{oss}$	Output Capacitance		-	233	-	
$C_{rss}$	Reverse Transfer Capacitance		-	206	-	
$Q_g$	Total Gate Charge	$V_{DS} = -15V, I_D = -5A, V_{GS} = -10V$	-	22	-	nC
$Q_{gs}$	Gate-Source Charge		-	1	-	
$Q_{gd}$	Gate-Drain( "Miller" ) Charge		-	1.8	-	
<b>Switching Characteristics</b>						
$T_{d(on)}$	Turn-on Delay Time	$V_{DD} = -15V, I_D = -10A,$ $V_{GS} = -10V, R_{GEN} = 2.5 \Omega$	-	9	-	ns
$T_r$	Turn-on Rise Time		-	13	-	
$T_{d(off)}$	Turn-off Delay Time		-	48	-	
$T_f$	Turn-off Fall Time		-	20	-	
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain to Source Diode Forward Current		-	-	-12	A
$I_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-60	A
$V_{SD}$	Drain to Source Diode Forward	$V_{GS} = 0V, I_S = -15A$	-	-0.8	-1.2	V
$T_{rr}$	Reverse Recovery Time	$T_J = 25^\circ\text{C}, V_{DD} = -24V,$	-	64	-	ns
$Q_{rr}$	Reverse Recovery Charge	$I_F = -2.8A, di/dt = -100A/\mu s$	-	25	-	nC

**Notes:**

- 1.Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
- 2.EAS condition:  $T_J = 25^\circ\text{C}, V_{GS} = 10V, R_G = 25\Omega, L = 0.5mH, I_{AS} = -12.7A$
- 3.Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 0.5\%$

Typical Performance Characteristics

Figure 1: Output Characteristics

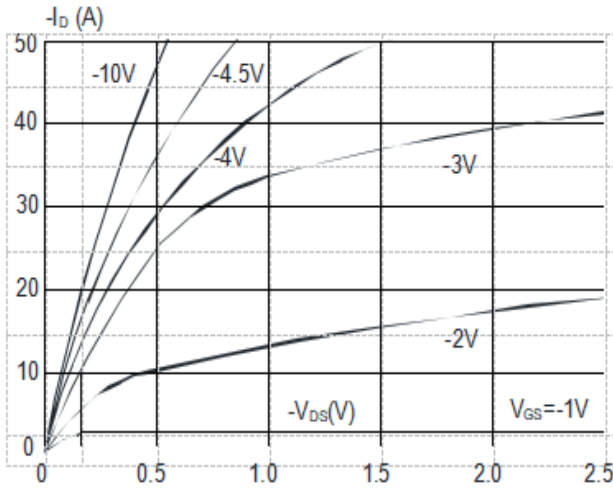


Figure 2: Typical Transfer Characteristics

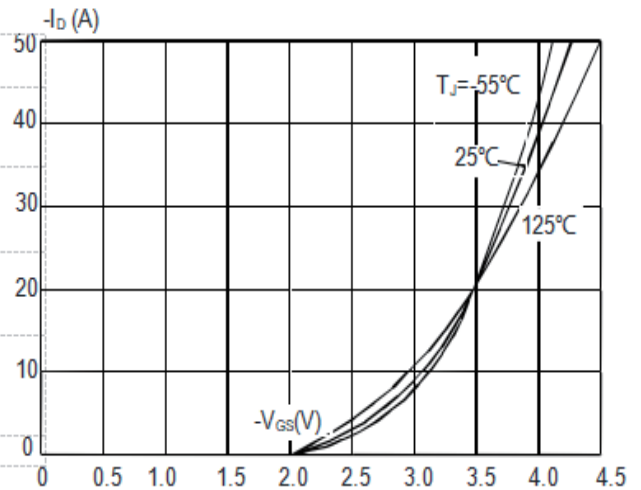


Figure 3: On-resistance vs. Drain Current

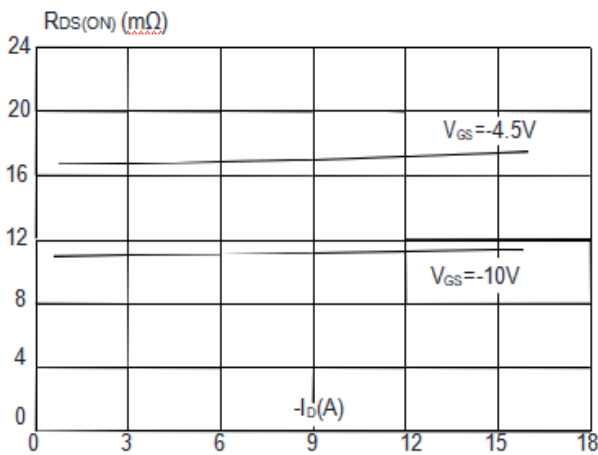


Figure 4: Body Diode Characteristics

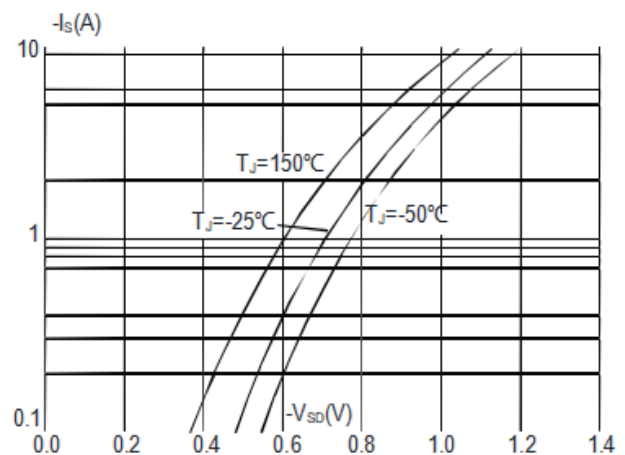


Figure 5: Gate Charge Characteristics

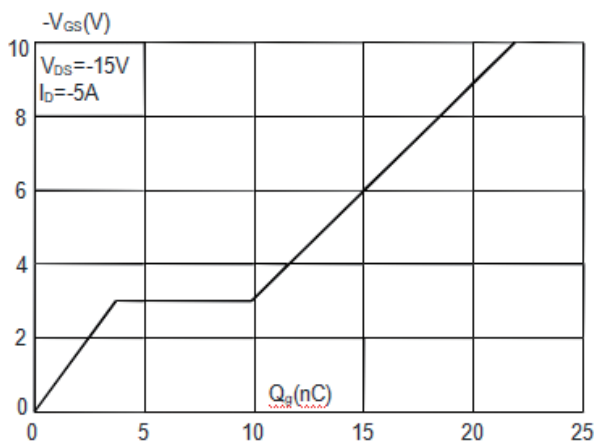
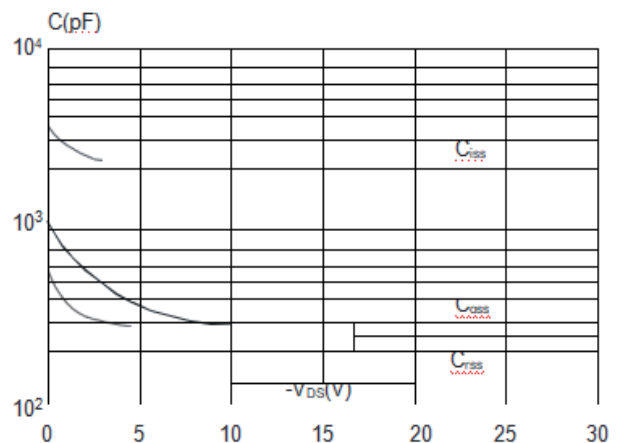


Figure 6: Capacitance Characteristics



Typical Performance Characteristics

Figure 7: Normalized Breakdown Voltage

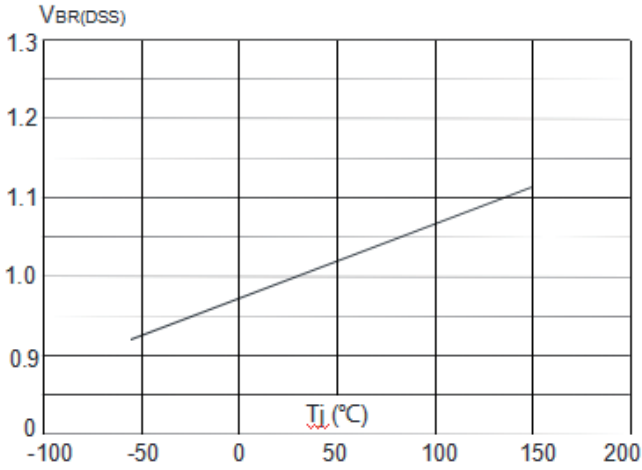


Figure 8: Normalized on Resistance vs. Junction Temperature

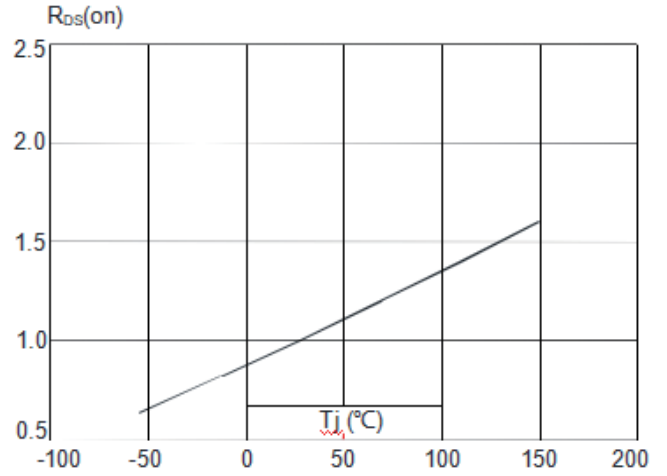


Figure 9: Maximum Safe Operating Area

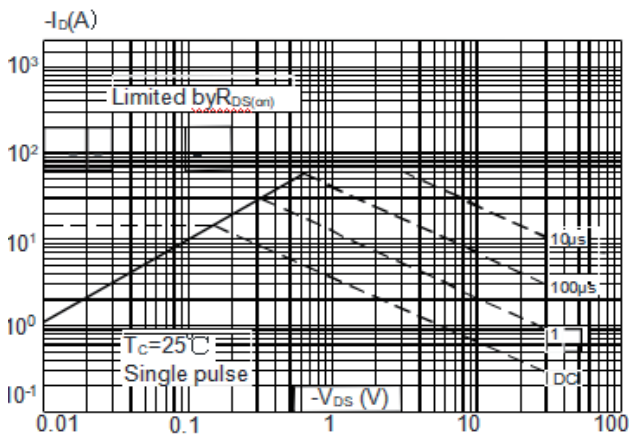


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

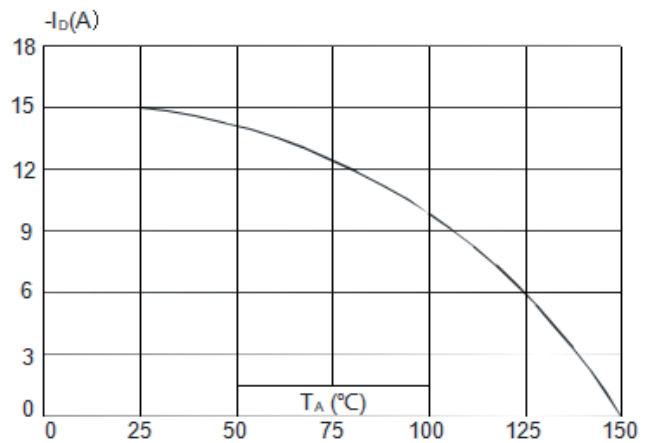
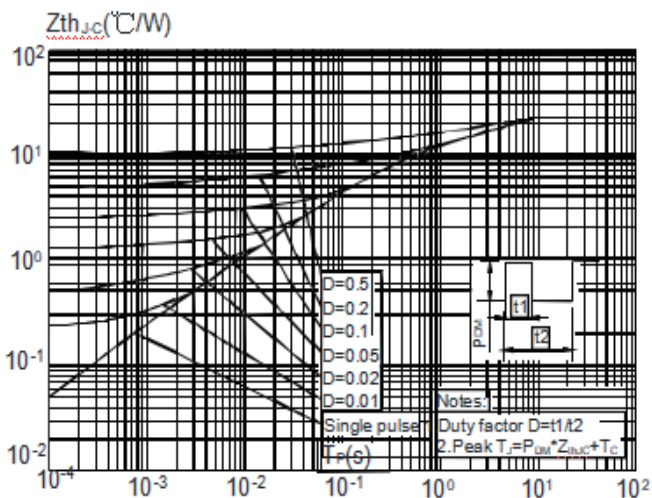
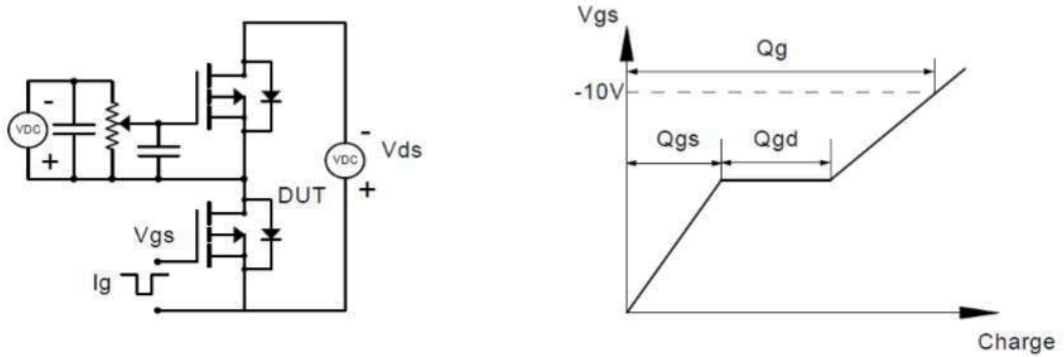


Figure.11: Maximum Effective Transient Thermal Impedance

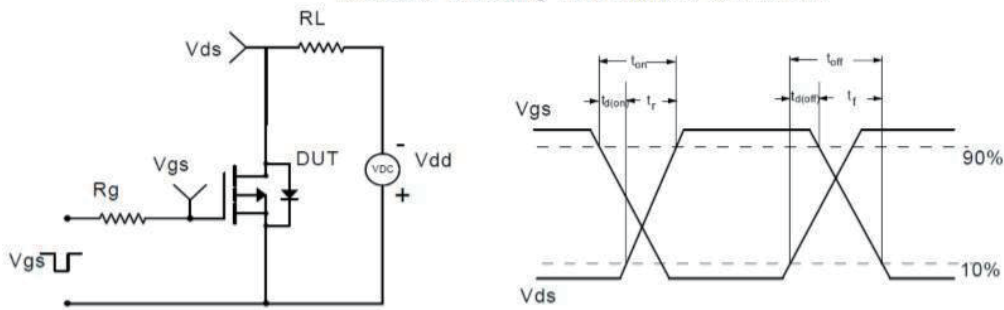


Test Circuit

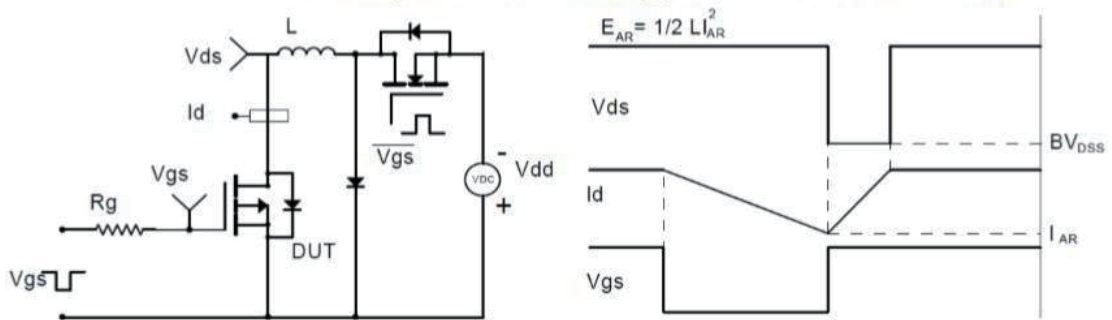
Gate Charge Test Circuit & Waveform



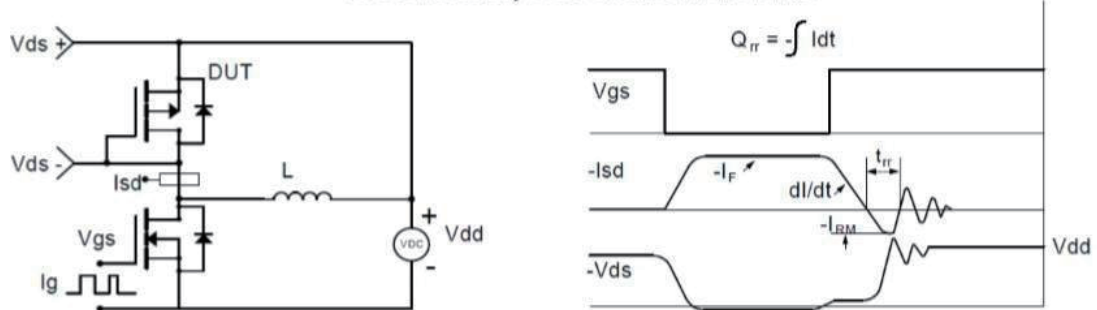
Resistive Switching Test Circuit & Waveforms



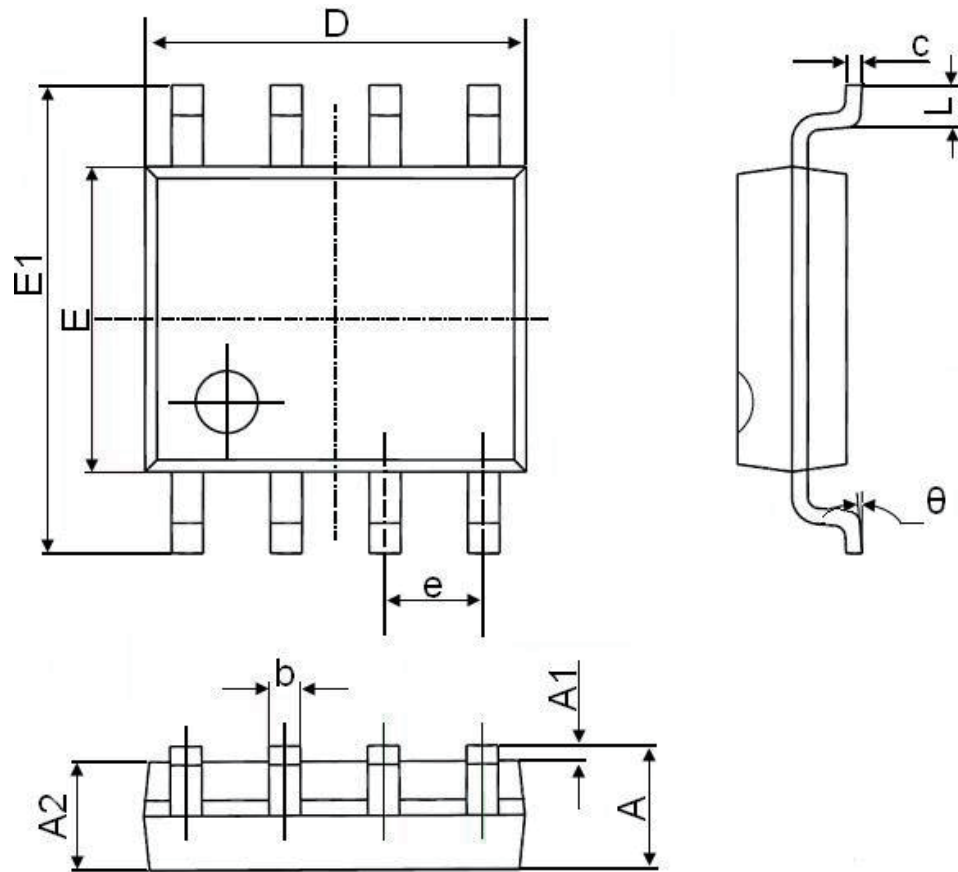
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Mechanical Data-SOP-8



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°