

P-Channel 30V(D-S) MOSFET

Product summary		
V_{DS}	-30	V
$R_{DS(ON)}$ (at $V_{GS}=-10V$) Typ.	12.5	m Ω
$R_{DS(ON)}$ (at $V_{GS}=-4.5V$) Typ.	19	m Ω
I_D ($T_A=25^\circ C$)	-12	A

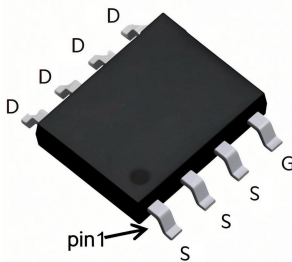
Features

- High density cell design for low $R_{DS(ON)}$
- Trench Power LV MOSFET technology
- High Speed switching

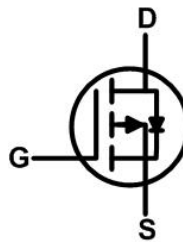
Applications

- Power management functions
- Load switch

Pin Configuration



SOP8



Packing Information

Device	Package	Reel Size	Quantity(Min. Package)
ECHA4407B	SOP8	13"	4000pcs

Absolute Maximum Ratings (at $T_A=25^\circ C$ Unless Otherwise Noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-30	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current ^A	$T_A=25^\circ C$	-12
		$T_A=70^\circ C$	-10
I_{DM}	Pulse Drain Current ^B	-49	A
E_{AS}	Single Pulse Avalanche Energy ^C	68	mJ
P_D	Power Dissipation ^A	3.3	W
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to +150	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Typical	Units
$R_{\theta JA}$	Thermal Resistance-Junction to ambient ^A	38	$^\circ C/W$

Electrical Characteristics (at $T_J = 25^\circ\text{C}$ Unless Otherwise Noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
Static Parameters						
BV_{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	μA
I_{GSS}	Gate-Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	--	--	± 100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-1.5	-2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance ^B	$V_{GS}=-10V, I_D=-10A$	--	12.5	16.5	m Ω
		$V_{GS}=-4.5V, I_D=-5A$	--	19	26	m Ω
V_{SD}	Diode Forward Voltage	$I_S=-12A, V_{GS}=0V$	--	--	-1.2	V
Dynamic Parameters ^D						
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=-15V$ $f=1\text{MHz}$	--	2152	--	pF
C_{oss}	Output Capacitance		--	290	--	pF
C_{riss}	Reverse Transfer Capacitance		--	242	--	pF
Q_g	Total Gate Charge	$V_{DS}=-15V, I_D=-5A$ $V_{GS}=-10V$	--	22	--	nC
Q_{gs}	Gate-Source Charge		--	4	--	nC
Q_{gd}	Gate-Drain Charge		--	5.9	--	nC
$t_{D(on)}$	Turn-on Delay Time	$V_{DD}=-15V$ $I_D=-10A, R_G=2.5\Omega,$ $V_{GS}=-10V$	--	9	--	ns
t_r	Turn-on Rise Time		--	14	--	ns
$t_{D(off)}$	Turn-off Delay Time		--	48	--	ns
t_f	Turn-off Fall Time		--	20	--	ns
t_{rr}	Reverse recovery time	$I_F=-12A,$ $di/dt=100\text{ A/uS}$	--	18	--	ns
Q_{rr}	Reverse recovery charge		--	7.8	--	nC

A. The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.

B. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

C. The EAS data shows Max. rating . The test condition is $V_{DD}=-15V, V_G=-10V, R_G=25\Omega, L=0.5\text{mH}, I_{AS}=-16.5A, T_J=25^\circ\text{C}$.

D. Guaranteed by design, not subject to production testing.

Typical Characteristics

Figure 1: Output Characteristics

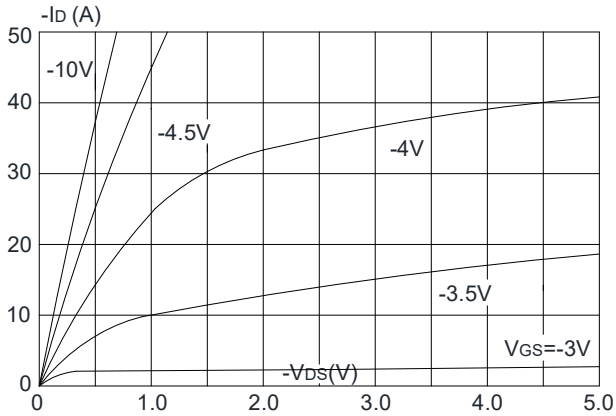


Figure 2: Typical Transfer Characteristics

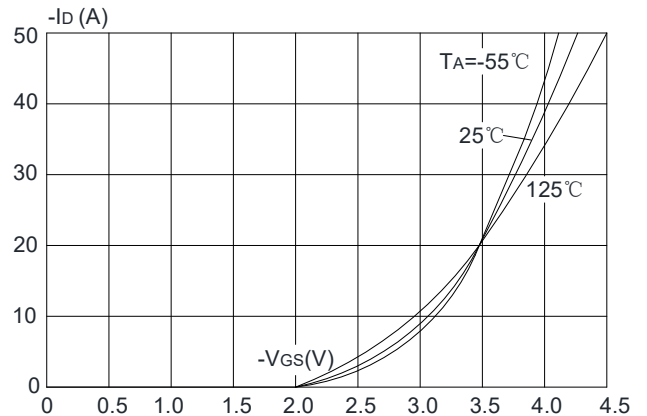


Figure 3: On-resistance vs. Drain Current

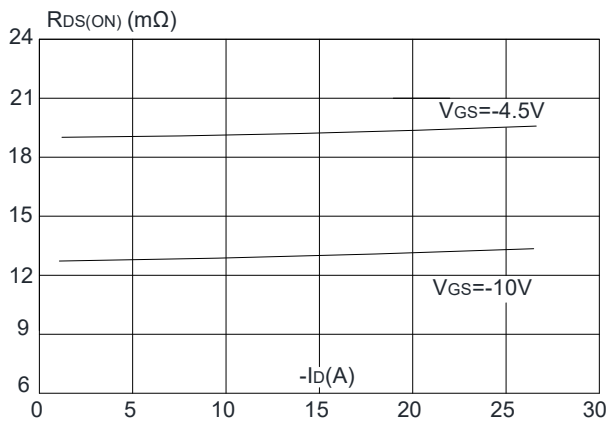


Figure 4: Body Diode Characteristics

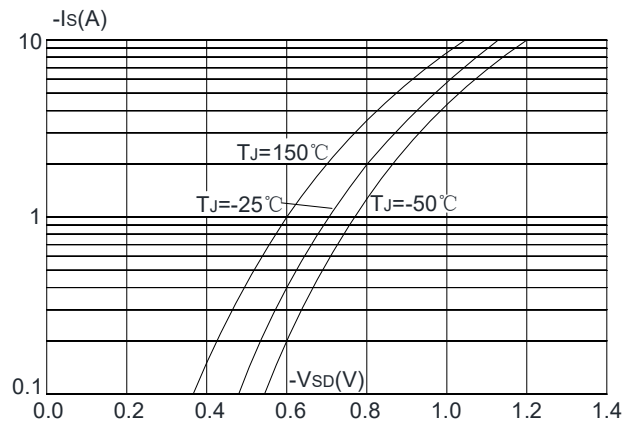


Figure 5: Gate Charge Characteristics

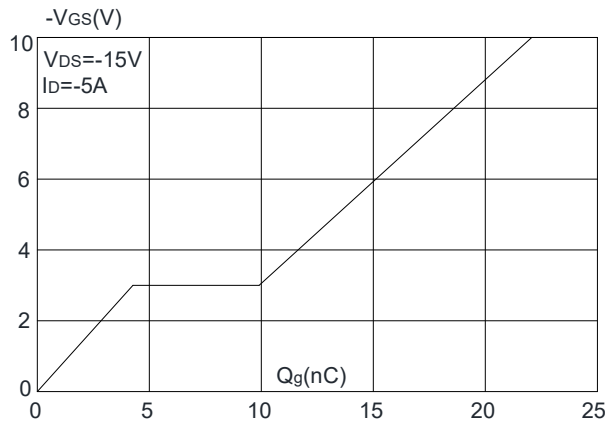
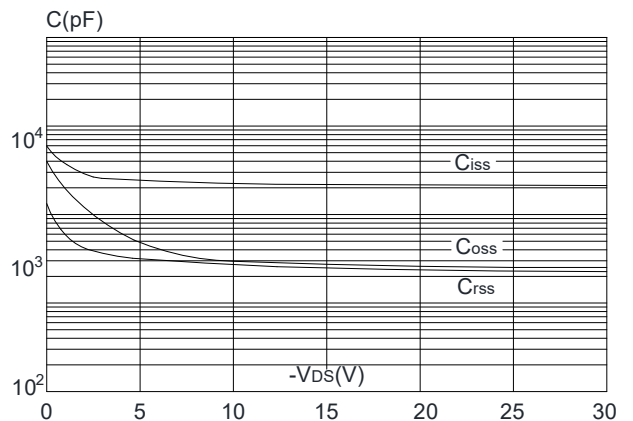


Figure 6: Capacitance Characteristics



Typical Characteristics

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

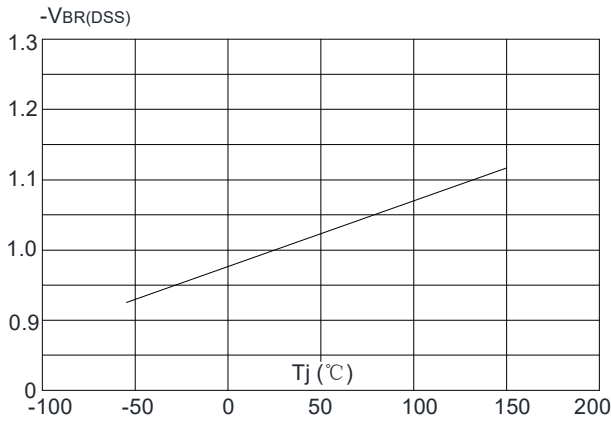


Figure 8: Normalized on Resistance vs. Junction Temperature

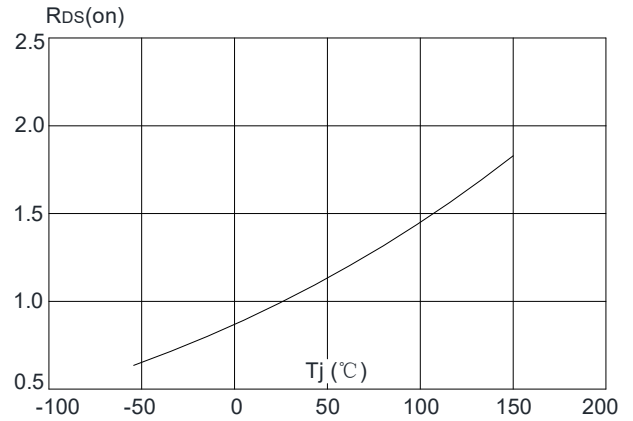


Figure 9: Maximum Safe Operating Area

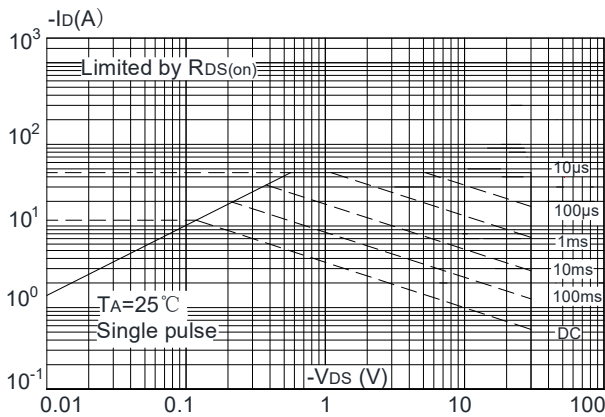


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

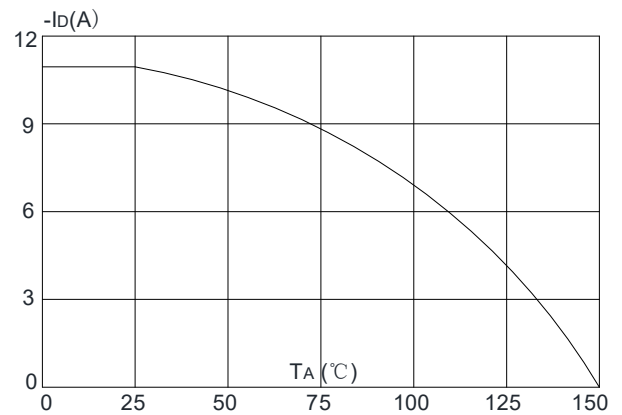
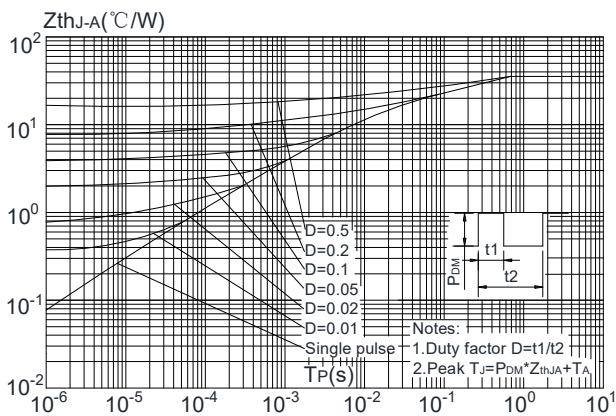
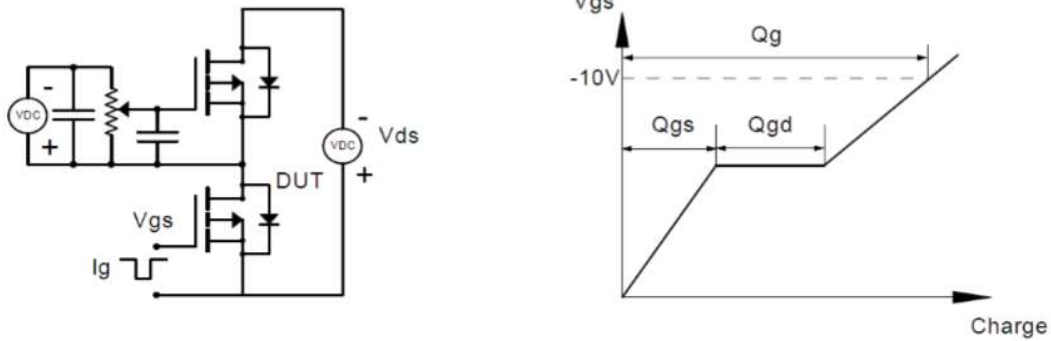


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

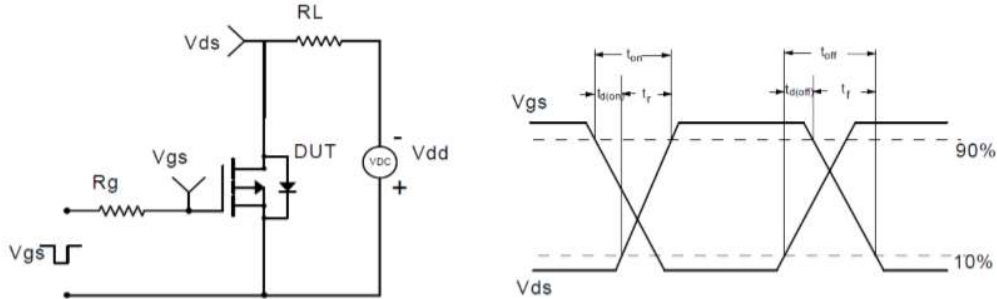


Test Circuit

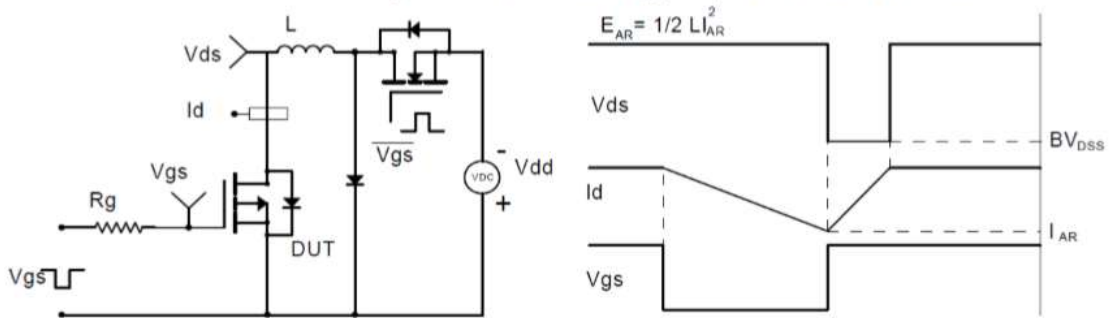
Gate Charge Test Circuit & Waveform



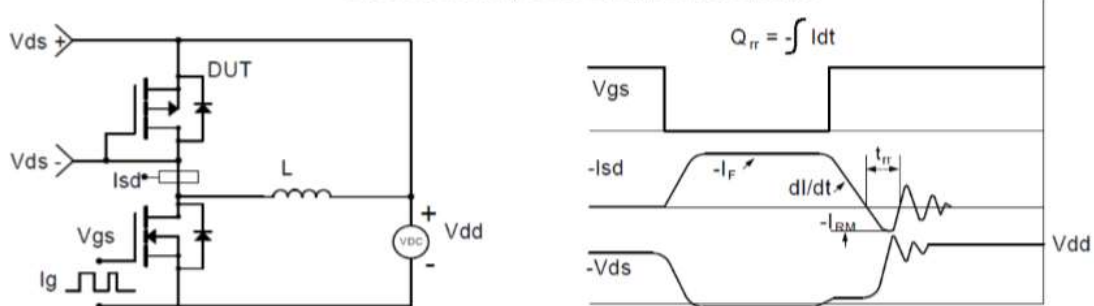
Resistive Switching Test Circuit & Waveforms



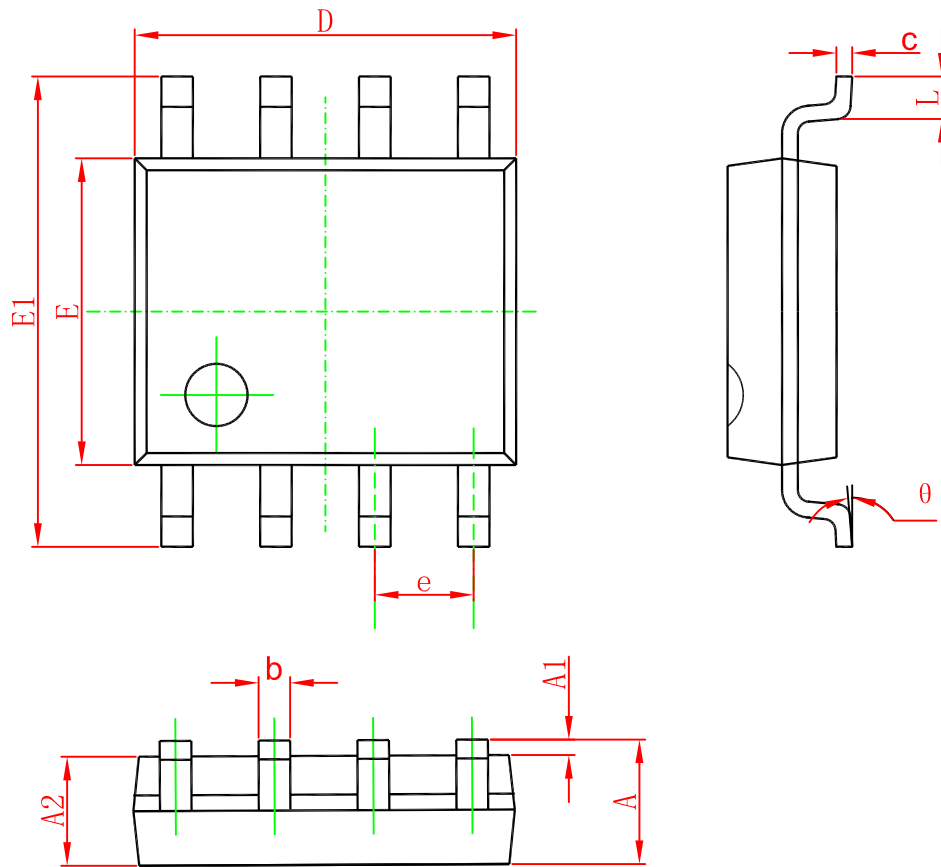
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



SOP8 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270 (BSC)		0.050 (BSC)	
L	0.400	1.270	0.016	0.050
theta	0°	8°	0°	8°