

## N-Channel 30V(D-S) MOSFET

Product summary		
$V_{DS}$	30	V
$R_{DS(ON)}$ (at $V_{GS}=10V$ ) Typ.	8.8	m $\Omega$
$R_{DS(ON)}$ (at $V_{GS}=4.5V$ ) Typ.	13	m $\Omega$
$I_D$ ( $T_C=25^\circ C$ )	13	A

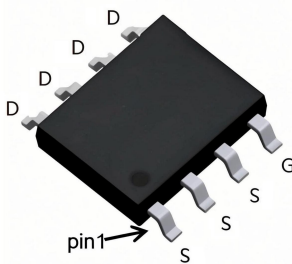
### Features

- Low Gate Charge
- Advanced high cell density Trench technology

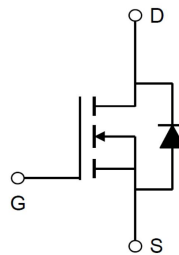
### Applications

- Power management functions

### Pin Configuration



SOP8



### Packing Information

Device	Package	Reel Size	Quantity(Min. Package)
ECHA13N03S	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	$\pm 20$	V
$I_D$	Continuous Drain Current	$T_C=25^\circ C$	13
		$T_C=100^\circ C$	8.5
$I_{DM}$	Pulse Drain Current <sup>A</sup>	52	A
$E_{AS}$	Single Pulse Avalanche Energy <sup>B</sup>	33	mJ
$P_D$	Power Dissipation @ $T_C=25^\circ C$	3.5	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 <sup>C</sup>	35.7	$^\circ C/W$

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

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
<b>Static Parameters</b>						
$BV_{DSS}$	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	$\mu A$
$I_{GSS}$	Gate-Body Leakage Current	$V_{DS}=0V, V_{GS}=\pm 20V$	--	--	$\pm 100$	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 <sup>D</sup>	$V_{GS}=10V, I_D=13A$	--	8.8	12	m $\Omega$
		$V_{GS}=4.5V, I_D=10A$	--	13	18	m $\Omega$
$V_{SD}$	Diode Forward Voltage	$I_S=13A, V_{GS}=0V$	--	--	1.2	V
$I_S$	Maximum Continuous Drain to Source Diode Forward Current	$V_G=V_D=0V$	--	--	13	A
<b>Dynamic Parameters <sup>E</sup></b>						
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=15V$ $f=1\text{MHz}$	--	1011	--	pF
$C_{oss}$	Output Capacitance		--	142	--	pF
$C_{rss}$	Reverse Transfer Capacitance		--	119	--	pF
$Q_g$	Total Gate Charge	$V_{DS}=15V, I_D=6A$ $V_{GS}=10V$	--	19	--	nC
$Q_{gs}$	Gate-Source Charge		--	6.3	--	nC
$Q_{gd}$	Gate-Drain Charge		--	4.5	--	nC
$t_{D(on)}$	Turn-on Delay Time	$V_{DS}=15V$ $I_D=13A, R_{GEN}=3\Omega,$ $V_{GS}=10V$	--	6	--	ns
$t_r$	Turn-on Rise Time		--	5	--	ns
$t_{D(off)}$	Turn-off Delay Time		--	25	--	ns
$t_f$	Turn-off Fall Time		--	7	--	ns

A. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.

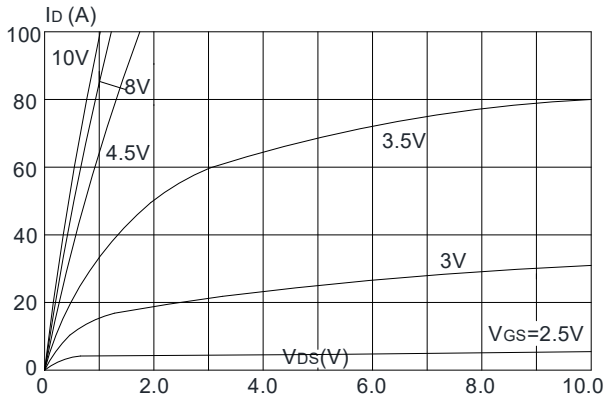
B. The EAS data shows Max. Rating, The test condition is  $V_{DD}=15V, V_{GS}=10V, L=0.5\text{mH}, I_{AS}=6.6A, R_g=25\Omega, T_J=25^\circ\text{C}$ .

C. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.

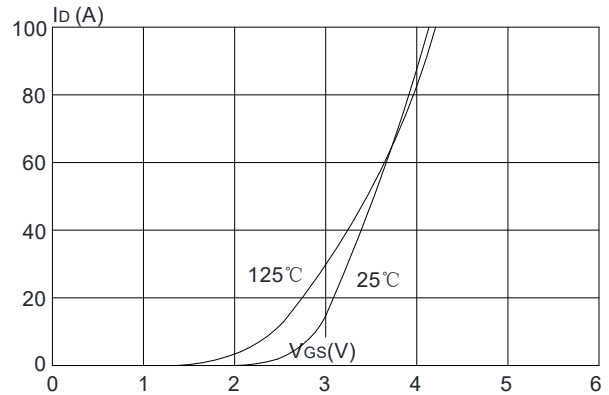
D. The data tested by pulsed , pulse width $\leq 300\mu s$  , duty cycle $\leq 2\%$ .

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

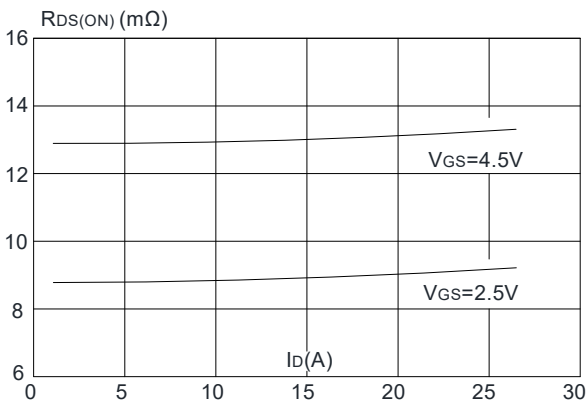
**Typical Characteristics**



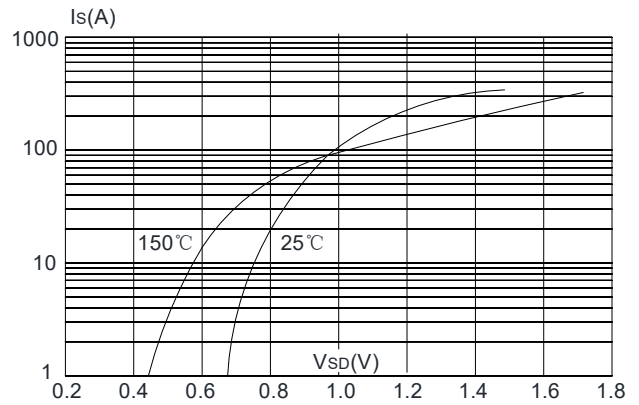
**Figure 1:** Output Characteristics



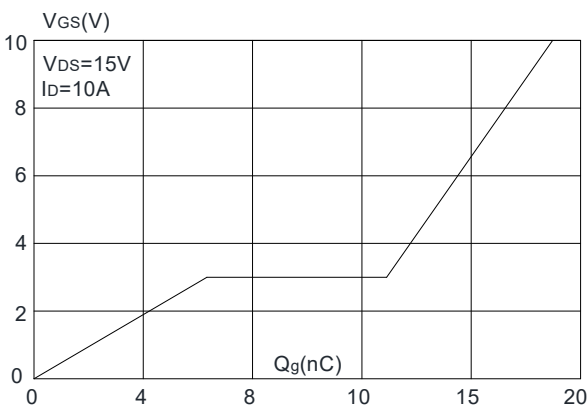
**Figure 2:** Typical Transfer Characteristics



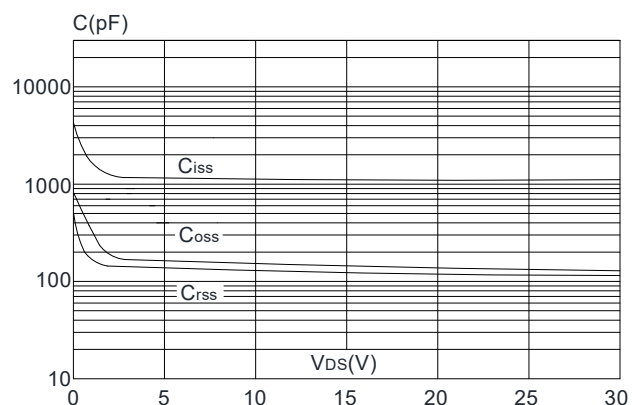
**Figure 3:** On-resistance vs. Drain Current



**Figure 4:** Body Diode Characteristics

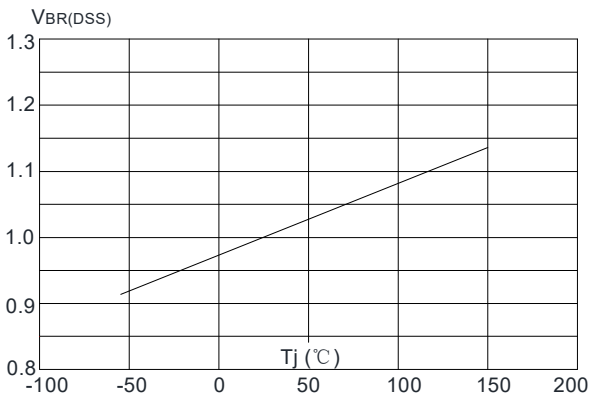


**Figure 5:** Gate Charge Characteristics

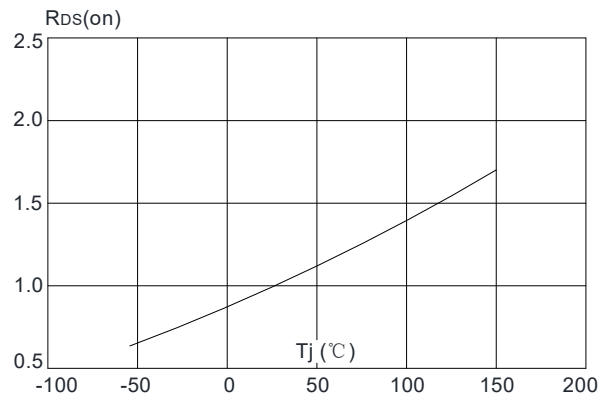


**Figure 6:** Capacitance Characteristics

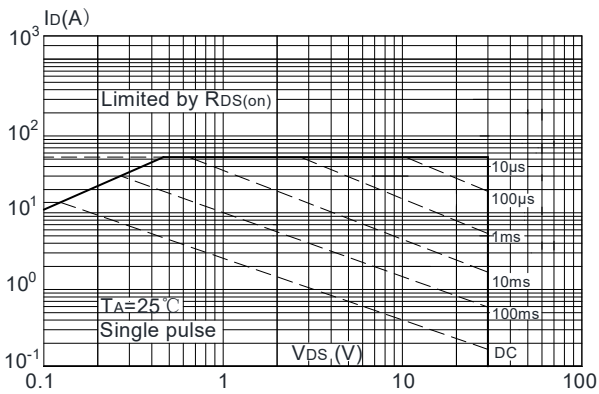
Typical Characteristics



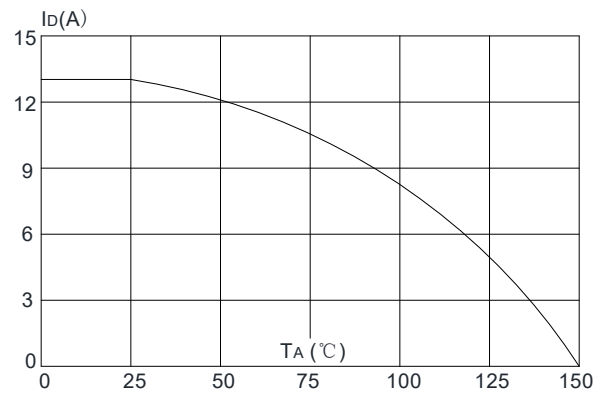
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



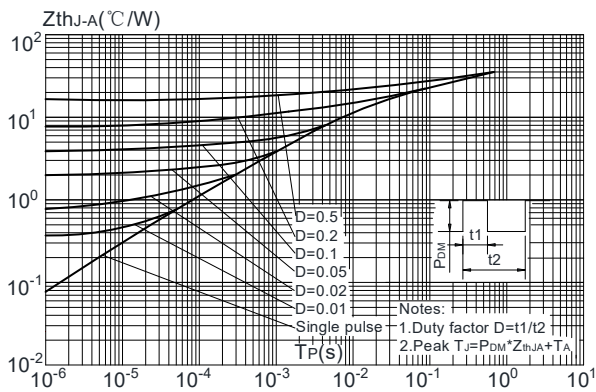
**Figure 8:** Normalized on Resistance vs. Junction Temperature



**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

Typical Characteristics

**Test Circuit**

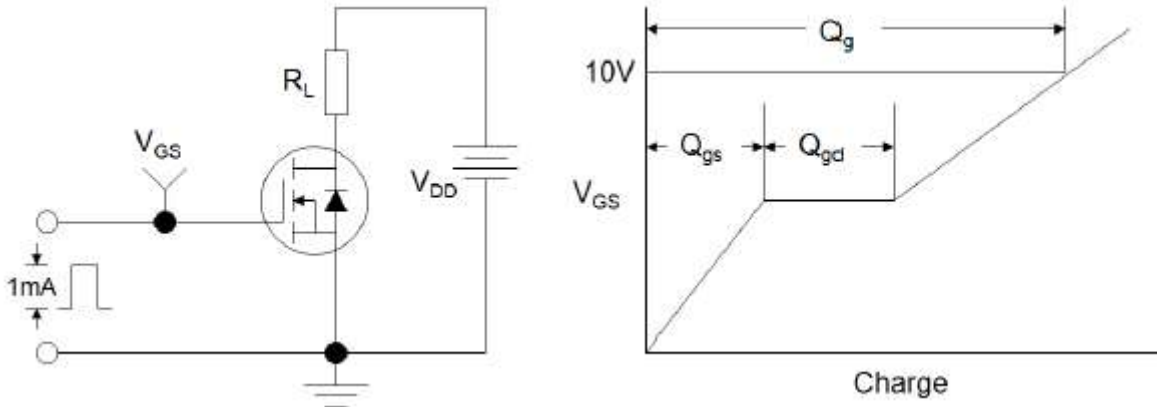


Figure1:Gate Charge Test Circuit & Waveform

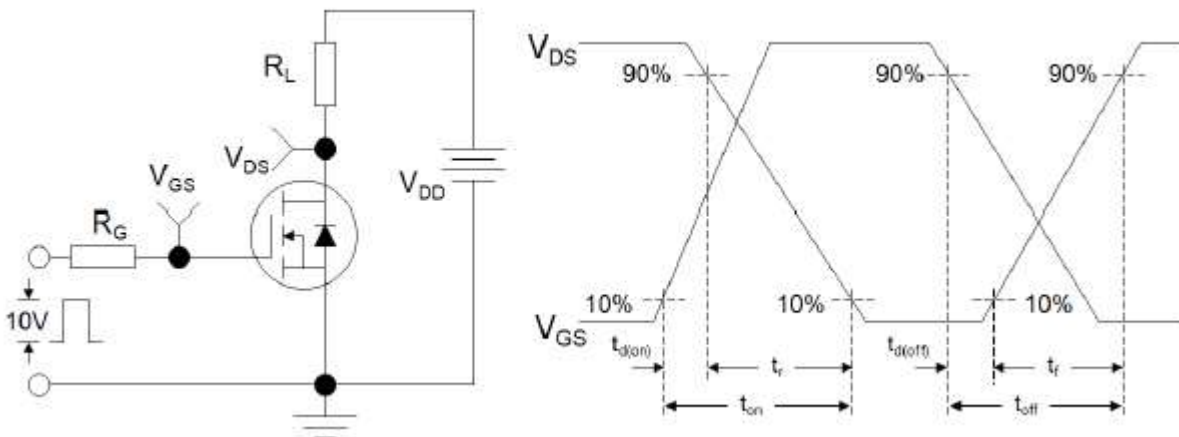


Figure 2: Resistive Switching Test Circuit & Waveforms

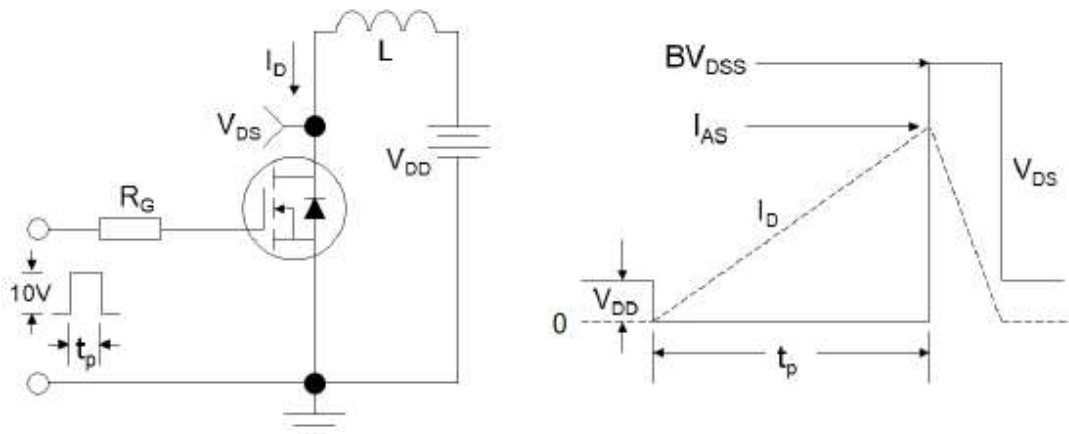
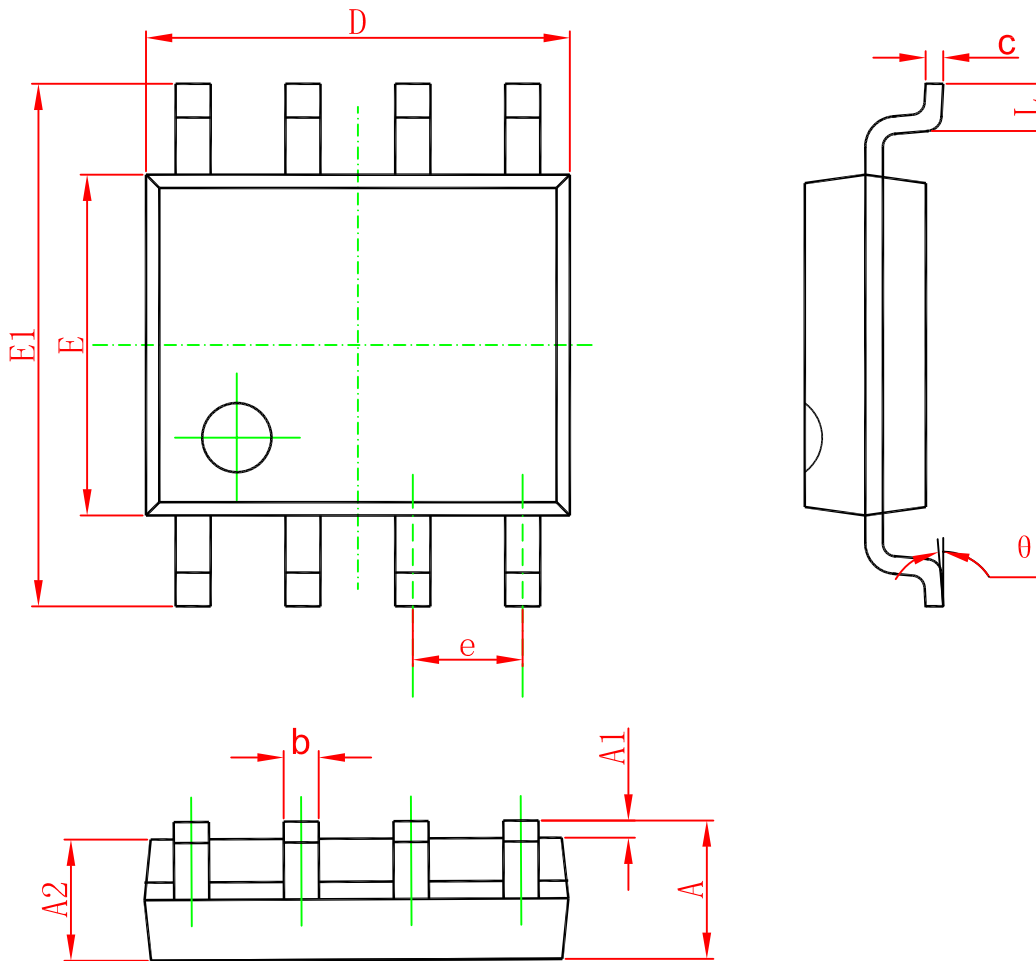


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

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
θ	0°	8°	0°	8°