

## MS13N30

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

#### Description

These miniature surface mount MOSFETs utilize High Cell Density process. Low  $r_{DS(on)}$  assures minimal power loss and conserves energy, making this device ideal for use in power management circuitry. Typical applications are lower voltage application, power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones

#### Features

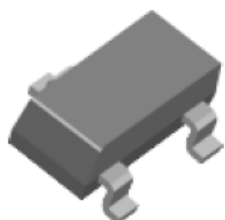
- Low  $r_{DS(on)}$  trench technology
- Fast switching speed
- Low thermal impedance
- RoHS compliant package

#### Applications:

- Power Routing
- Li Ion Battery Packs
- Level Shifting and Driver Circuits

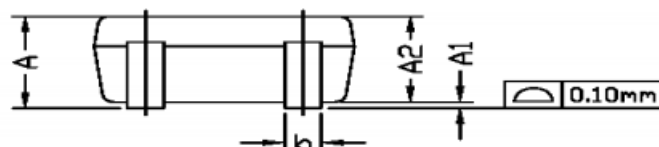
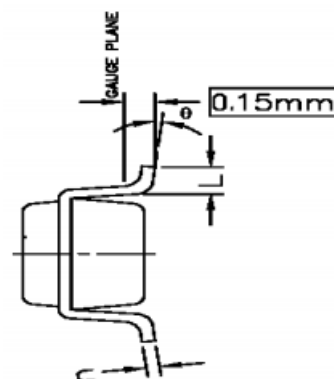
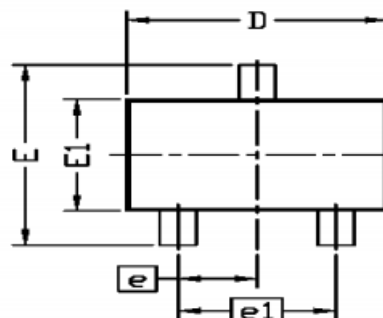
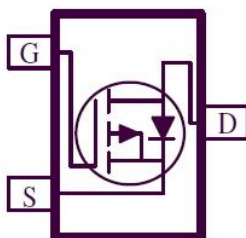
#### Packing & Order Information

3,000/Reel



**RoHS**  
COMPLIANT

#### Graphic symbol



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	—	—	1.10	—	—	0.043
A1	0.00	—	0.10	0.00	—	0.004
A2	0.7	0.9	1.00	0.028	0.035	0.039
b	0.15	—	0.30	0.006	—	0.012
c	0.08	—	0.22	0.003	—	0.009
D	1.85	2.10	2.15	0.073	0.083	0.085
E	1.80	2.30	2.40	0.071	0.091	0.094
e	0.65 BSC			0.026 BSC		
e1	1.30 BSC			0.051 BSC		
E1	1.1	1.30	1.4	0.043	0.051	0.055
L	0.26	0.36	0.46	0.010	0.014	0.018
θ	0°	4°	8°	0°	4°	8°

## MS13N30

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

#### MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

##### Absolute Maximum Ratings ( $T_A=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D$	Continuous Drain Current <sup>a</sup> ( $T_A=25^{\circ}\text{C}$ )	2.0	A
	Continuous Drain Current <sub>a</sub> ( $T_A=70^{\circ}\text{C}$ )	1.6	A
$I_{DM}$	Pulsed Drain Current <sup>b</sup>	10	A
$I_S$	Continuous Source Current (Diode Conduction) <sup>a</sup>	0.45	A
$P_D$	Power Dissipation <sup>a</sup> ( $T_A=25^{\circ}\text{C}$ )	0.34	W
	Power Dissipation <sup>a</sup> ( $T_A=70^{\circ}\text{C}$ )	0.22	W
$T_J/T_{STG}$	Operating Junction and Storage Temperature	-55 to +150	$^{\circ}\text{C}$

##### Thermal Resistance Ratings

Symbol	Parameter	Maximum	Units
$R_{THJA}$	Maximum Junction-to-Ambient $C/W^a$ ( $t \leq 10$ sec)	375	$^{\circ}\text{C/W}$
	Maximum Junction-to-Ambient $C/W^a$ (Steady-State)	430	

##### Notes

- a. Surface Mounted on 1" x 1" FR4 Board.  
b. Pulse width limited by maximum junction temperature

##### Static

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$V_{GS}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ , $I_D = -250\mu\text{A}$	1			V
$I_{GSS}$	Gate-Body Leakage	$V_{DS} = 0$ V, $V_{GS} = \pm 20$ V			$\pm 100$	nA
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 24$ V, $V_{GS} = 0$ V $V_{DS} = 24$ V, $V_{GS} = 0$ V, $T_J = 55^{\circ}\text{C}$			1 10	$\mu\text{A}$
$I_{D(on)}$	On-State Drain Current <sup>A</sup>	$V_{DS} = 5$ V, $V_{GS} = 10$ V	3			A
$R_{DS(on)}$	Drain-Source On-Resistance <sup>A</sup>	$V_{GS} = 10$ V, $I_D = 1.6$ A $V_{GS} = 4.5$ V, $I_D = 1.3$ A			58 82	m $\Omega$
$g_{fs}$	Forward Transconductance <sup>A</sup>	$V_{DS} = 15$ V, $I_D = 1.6$ A		4		S
$V_{SD}$	Diode Forward Voltage	$I_S = 0.25$ V, $V_{GS} = 0$ V		0.74		V

##### Dynamic<sup>b</sup>

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{DS} = 15$ V, $R_L = 9.4$ $\Omega$ , $V_{GEN} = 10$ V, $R_{GEN} = 6$ $\Omega$ $I_D = 1.6$ A	--	4	--	ns
$t_r$	Rise Time		--	7	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	19	--	ns
$t_f$	Fall Time		--	5	--	ns

## MS13N30

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

Dynamic <sup>b</sup>						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$Q_g$	Total Gate Charge	$V_{DS} = 15\text{ V}$ , $I_D = 1.6\text{ A}$ $V_{GS} = 4.5\text{ V}$	--	5.9	--	nC
$Q_{gs}$	Gate-Source Charge		--	2.1	--	nC
$Q_{gd}$	Gate-Drain Charge		--	2.1	--	nC
$C_{ISS}$	Input Capacitance	$V_{GS} = 0\text{ V}$ , $V_{DS} = 15\text{ V}$ , $f = 1\text{ MHz}$	--	513	--	pF
$C_{OSS}$	Output Capacitance		--	69	--	pF
$C_{RSS}$	Reverse Transfer Capacitance		--	54	--	pF

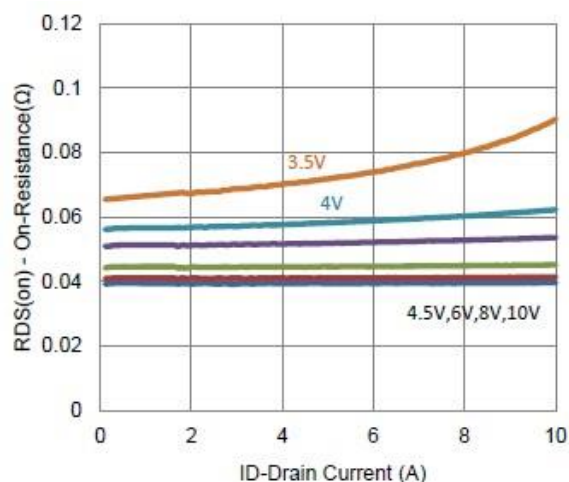
### Notes

- a. Pulse test:  $PW \leq 300\mu s$  duty cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.

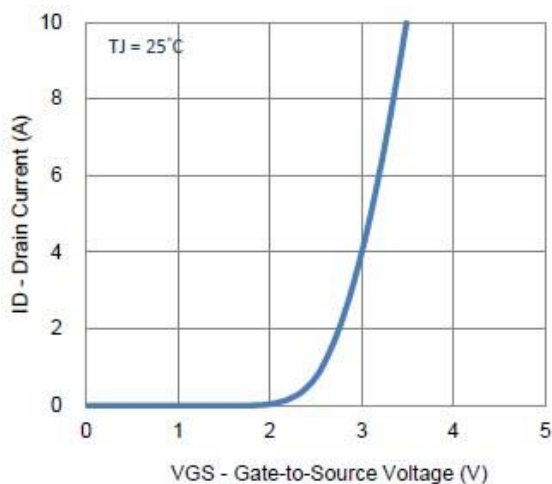
## MS13N30

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

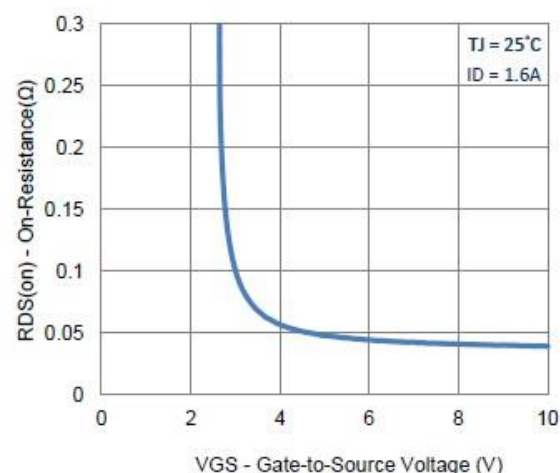
#### Typical Electrical Characteristics



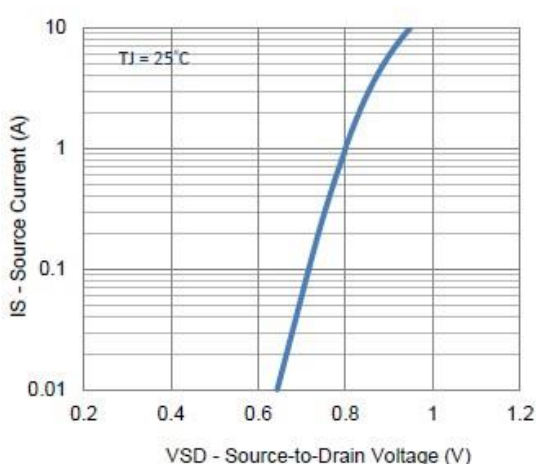
**FIG.1-ON-RESISTANCE VS. DRAIN CURRENT**



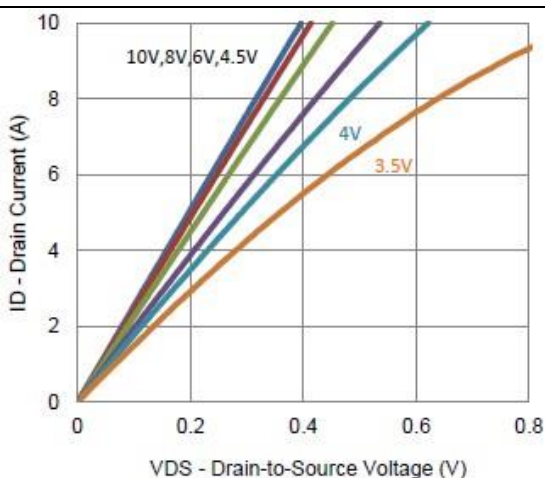
**FIG.2-TRANSFER CHARACTERISTICS**



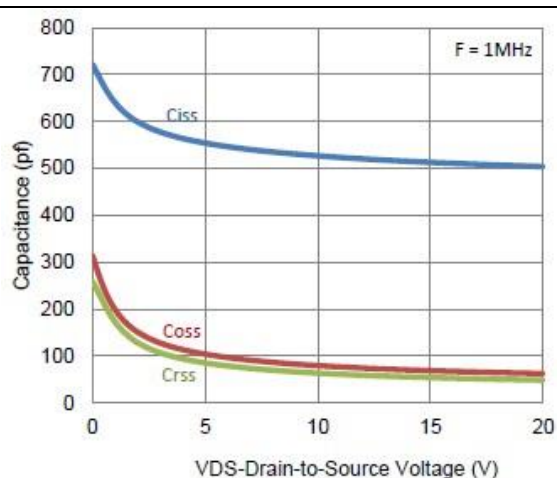
**FIG.3- ON-RESISTANCE VS. GATE-TO-SOURCE VOLTAGE**



**FIG.4-DRAIN-TO SOURCE FORWARD WOLTAGE**



**FIG.5-OUTPUT CHARACTERISTICS**



**FIG.6-CAPACITANCE**

## MS13N30

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

### Typical Electrical Characteristics

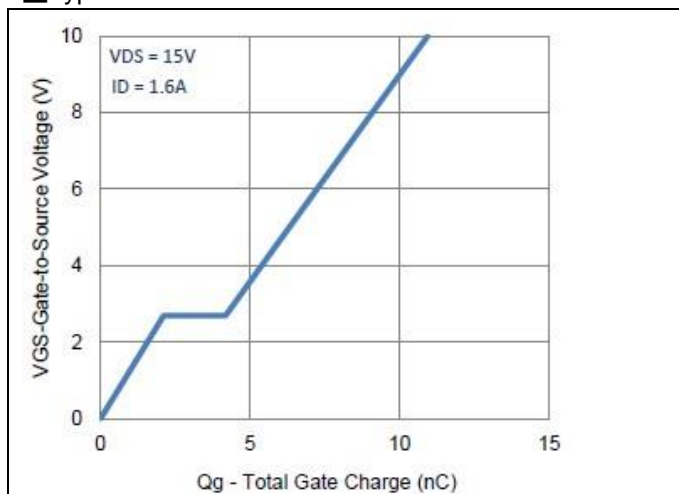


FIG.7-GATE CHARGE

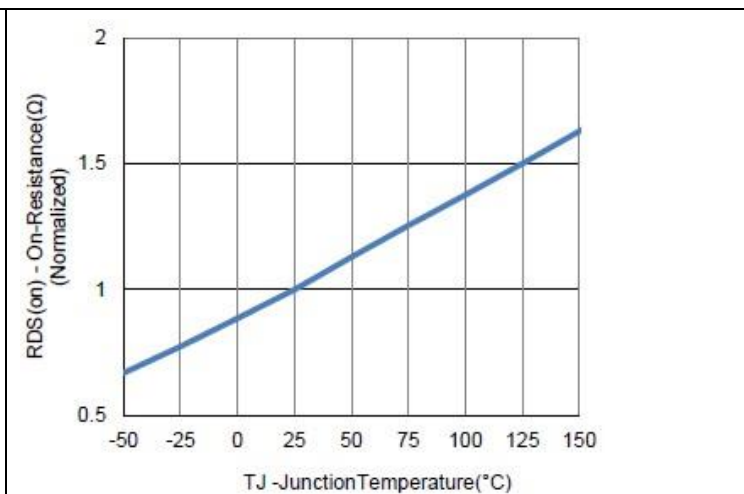


FIG.8-NORMALIZED ON-RESISTANCE VS JUNCTION TEMPERATURE

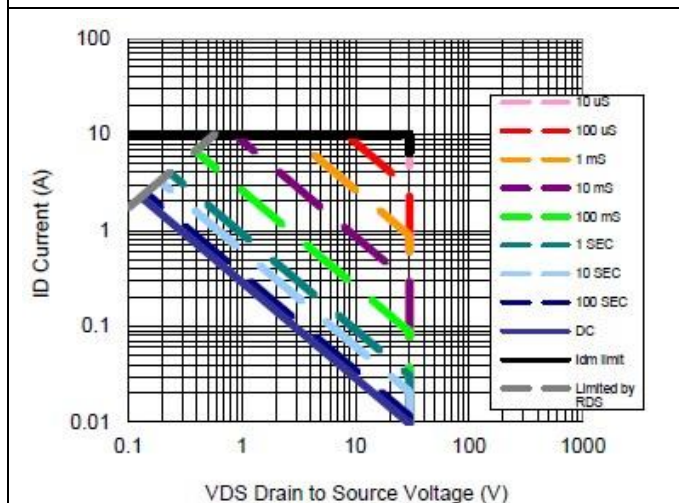


FIG.9-SAFE OPERATING AREA

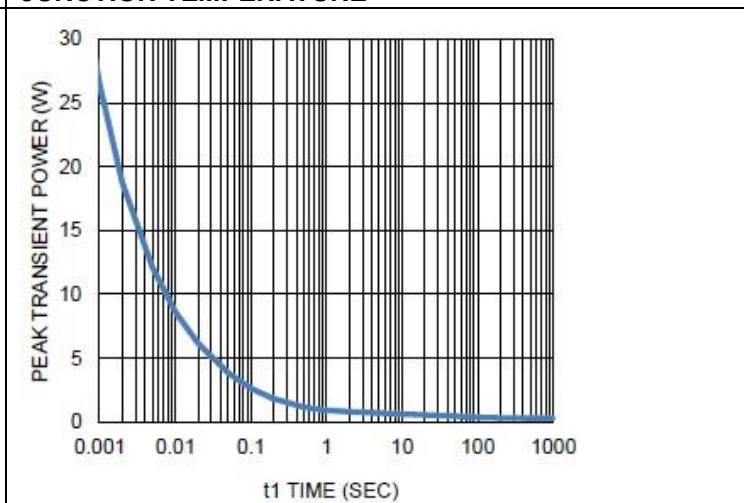


FIG.10-SINGLE PULSE MAXIMUM POWER DISSIPATION

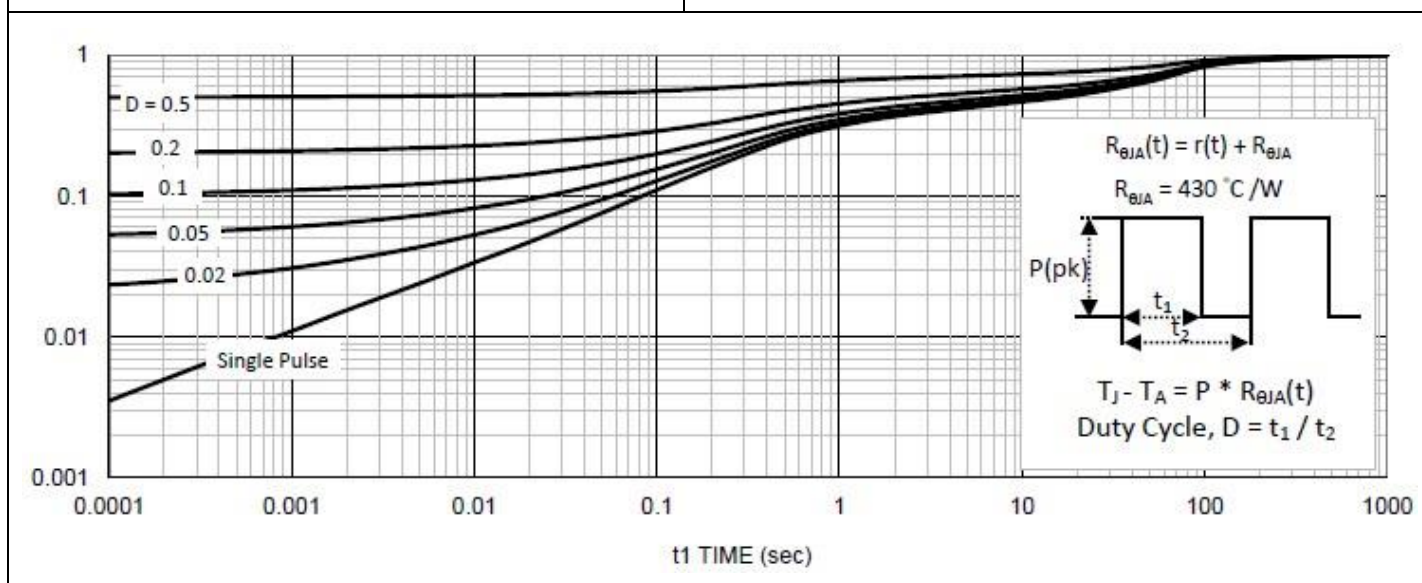


FIG.11-NORMALIZED THERMAL TRANSIENT JUNCTION TO AMBIENT

## MS13N30

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

#### Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Bruckewell Technology Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Bruckewell"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product. Bruckewell makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Bruckewell disclaims

- (i) Any and all liability arising out of the application or use of any product.
- (ii) Any and all liability, including without limitation special, consequential or incidental damages.
- (iii) Any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Bruckewell's knowledge of typical requirements that are often placed on Bruckewell products in generic applications.

Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time.

Product specifications do not expand or otherwise modify Bruckewell's terms and conditions of purchase, including but not limited to the warranty expressed therein.