

## MS48P35

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

#### Description

These miniature surface mount MOSFETs utilize a high cell density trench process to provide low  $R_{DS(on)}$  and to ensure minimal power loss and heat dissipation.

Typical applications are DC-DC converters and power management in portable and battery-powered products such as computers, printers, and PCMCIA cards, cellular and cordless telephones.

#### Features

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

#### Typical Applications:

- White LED boost converters
- Automotive Systems
- Industrial DC/DC Conversion Circuits

**Package type :** SO-8

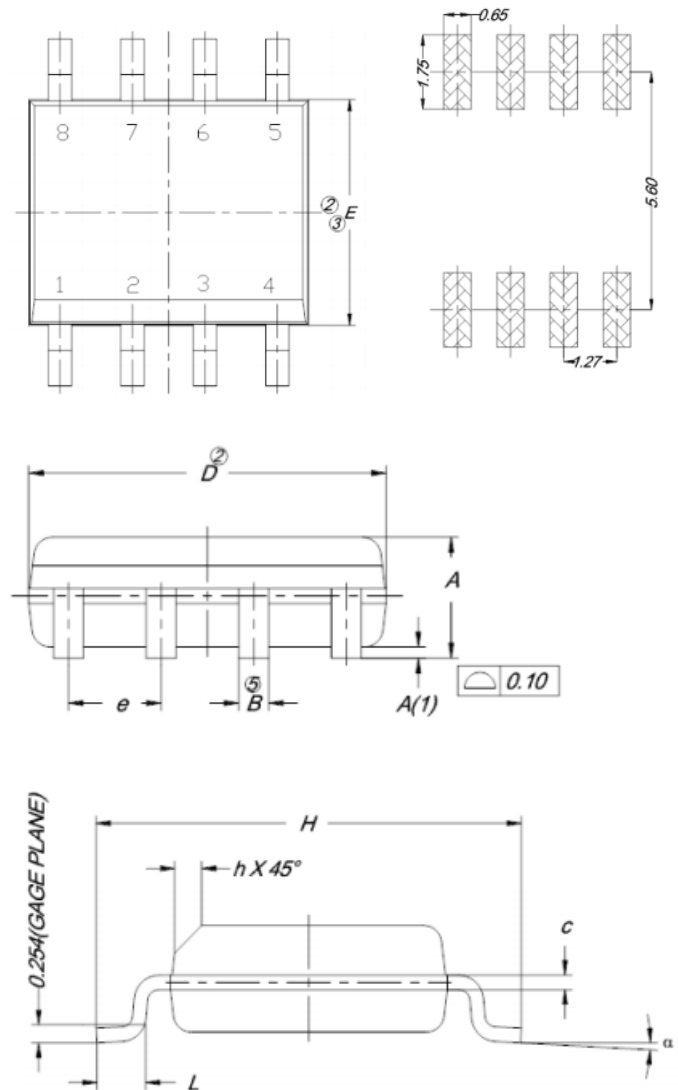
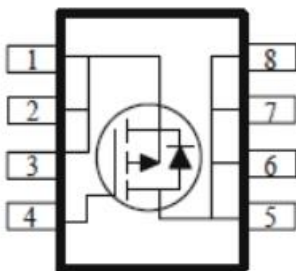
#### Packing & Order Information

3,000/Reel



**RoHS  
COMPLIANT**

#### Graphic symbol



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	1.35	1.55	1.75
A(1)	0.10	0.18	0.25
B	0.38	0.45	0.51
C	0.19	0.22	0.25
D	4.80	4.90	5.00
E	3.80	3.90	4.00
e	1.27 BSC		
H	5.80	6.00	6.20
L	0.50	0.72	0.93
$\alpha$	0°	4°	8°
h	0.25	0.38	0.50

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#### 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> ( $T_A=25^\circ\text{C}$ )	-9.5	A
	Continuous Drain Current <sup>a</sup> ( $T_A=70^\circ\text{C}$ )	-8.3	A
$I_{DM}$	Pulsed Drain Current <sup>b</sup>	-50	A
$I_S$	Continuous Source Current (Diode Conduction) <sup>a</sup>	-4	A
$P_D$	Power Dissipation <sup>a</sup> ( $T_A=25^\circ\text{C}$ )	3.1	W
	Power Dissipation <sup>a</sup> ( $T_A=70^\circ\text{C}$ )	2.2	W
$T_J/T_{STG}$	Operating Junction and Storage Temperature	-55 to +150	$^\circ\text{C}$

##### Thermal Resistance Ratings

Symbol	Parameter	Maximum	Units
$R_{\theta JA}$	Maximum Junction-to-Ambient <sup>a</sup> ( $t \leq 10$ sec)	40	$^\circ\text{C/W}$
	Maximum Junction-to-Ambient <sup>a</sup> (Steady-State)	80	

Notes :

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

##### Static

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$V_{GS(th)}$	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 -25	$\mu\text{A}$
$I_{D(on)}$	On-State Drain Current	$V_{DS} = -5$ V, $V_{GS} = -10$ V	-20			A
$r_{DS(on)}$	Drain-Source On-Resistance	$V_{GS} = -10$ V, $I_D = -7.6$ A $V_{GS} = -4.5$ V, $I_D = -6$ A			19 30	m $\Omega$
$g_{fs}$	Forward Transconductance	$V_{DS} = -15$ V, $I_D = -7.6$ A		20		S
$V_{SD}$	Diode Forward Voltage	$I_S = -2$ A, $V_{GS} = 0$ V		-0.74		V

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

Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$Q_g$	Total Gate Charge	$V_{DS} = -15$ V, $I_D = -7.6$ A, $V_{GS} = -4.5$ V	--	31	--	nC
$Q_{gs}$	Gate-Source Charge		--	6.8	--	nC
$Q_{gd}$	Gate-Drain Charge		--	13	--	nC

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Dynamic <sup>b</sup>						
Symbol	Parameter	Test Conditions	Min	Typ.	Max.	Units
$t_{d(on)}$	Turn-On Delay Time	$V_{DS} = -15\text{ V}$ , $R_L = 1.9\ \Omega$ , $V_{GEN} = -10\text{ V}$ , $R_{GEN} = 6\ \Omega$ , $I_D = -7.6\text{ A}$	--	8	--	ns
$t_r$	Rise Time		--	16	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	98	--	ns
$t_f$	Fall Time		--	53	--	ns
$C_{ISS}$	Input Capacitance	$V_{DS} = -15\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1.0\text{ MHz}$	--	1934	--	pF
$C_{OSS}$	Output Capacitance		--	408	--	pF
$C_{RSS}$	Reverse Transfer Capacitance		--	226	--	pF

**NOTE:**

Pulse test:  $PW \leq 300\mu s$  duty cycle  $\leq 2\%$ .

Guaranteed by design, not subject to production testing.

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#### ■ Characteristic Curves

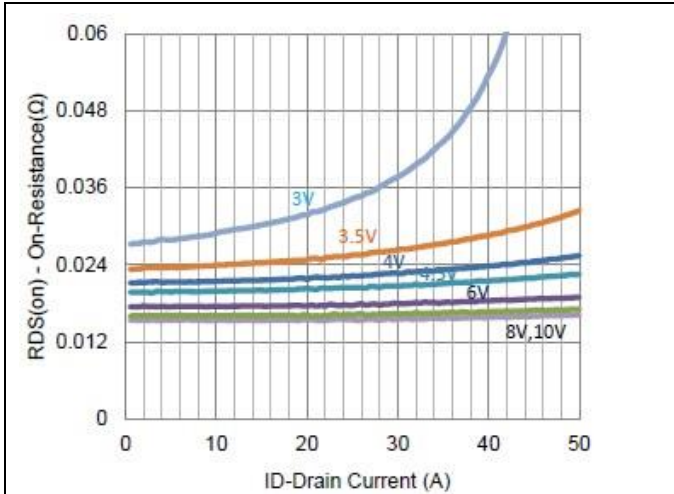


FIG.1-ON REGION CHARACTERISTICS

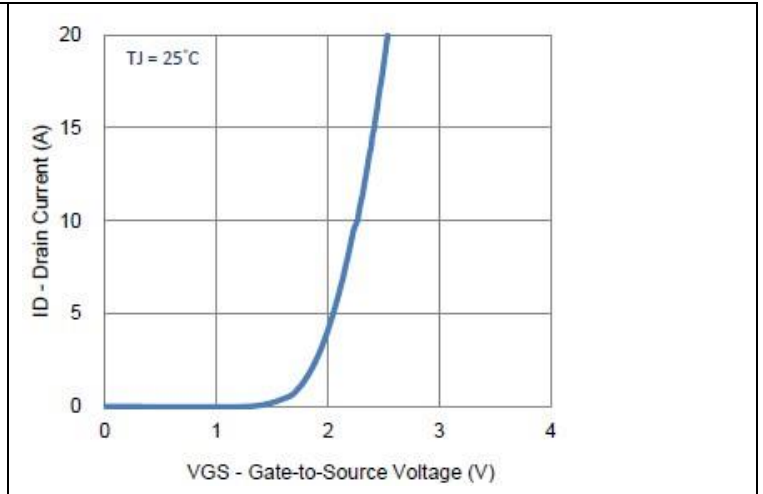


FIG.2- ON-RESISTANCE VARIATION WITH DRAIN CURRENT GATE VOLTAGE

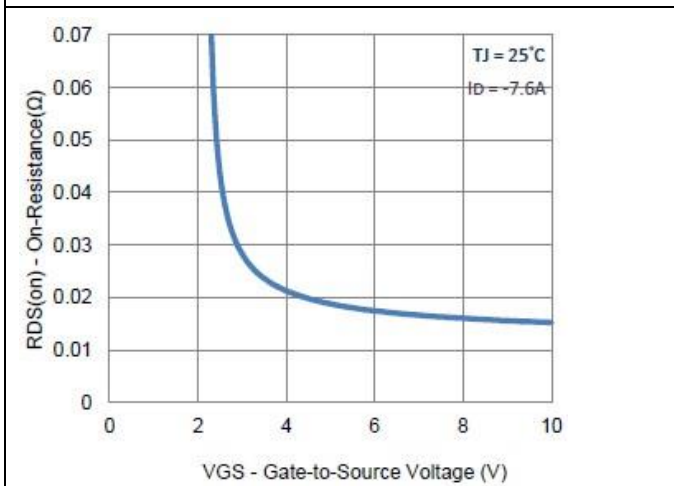


FIG.3-ON RESISTANCE VARIATION WITH TEMPERATURE

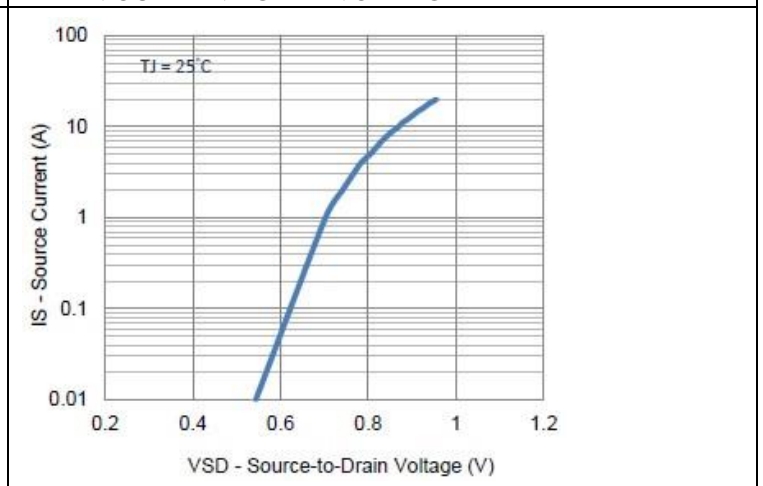


FIG.4-ON-RESISTANCE VARIATION WITH GATE TO SOURCE VOLTAGE

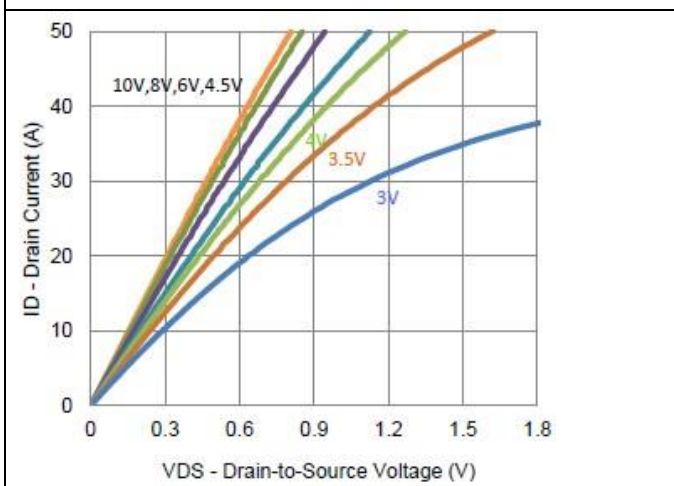


FIG.5-TRANSFER CHARACTERISTICS

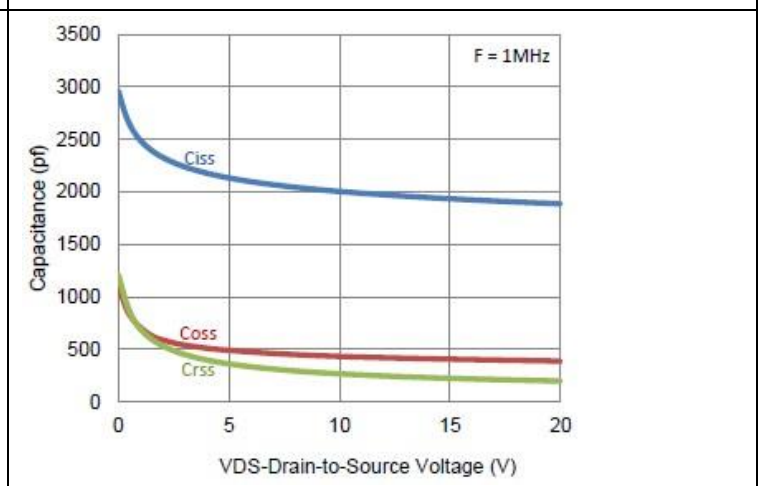


FIG.6-BODY DIODE FORWARD VOLTAGE VARIATION WITH WOURCE CURRENT AND TEMPERATURE

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#### Characteristic Curves

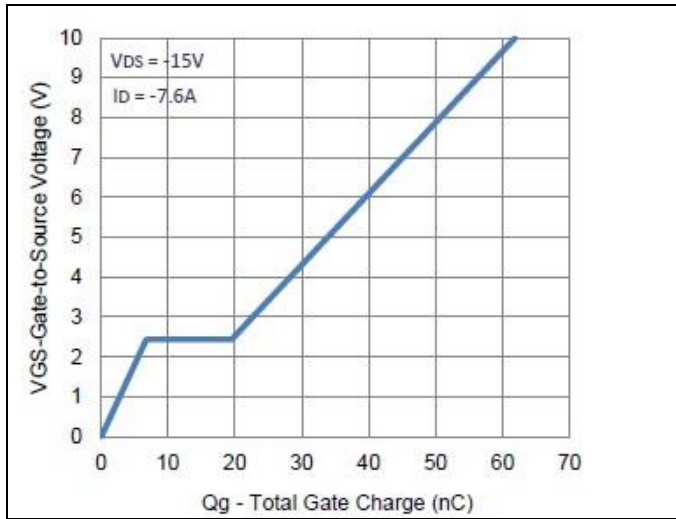


FIG. 7-GATE CHARGE CHARACTERISTICS

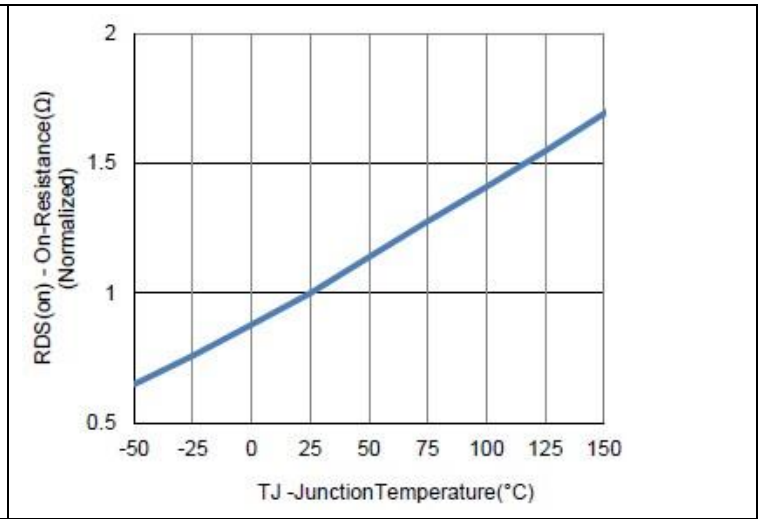


FIG. 8-CAPACITANCE CHARACTERISTICS

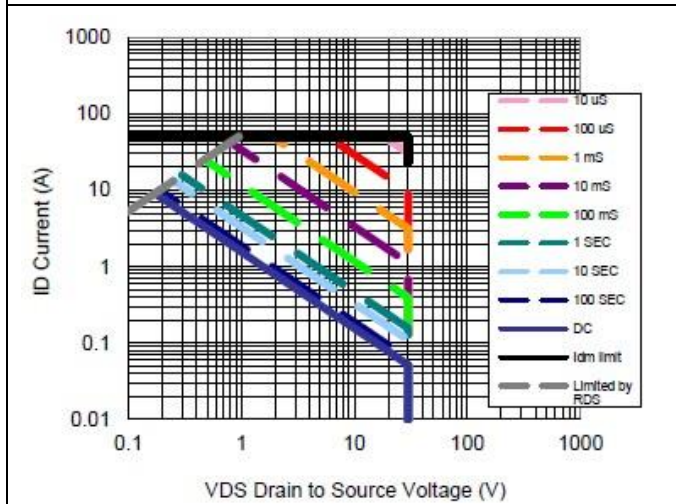


FIG. 9-MAXIMUM SAFE OPERATING AREA

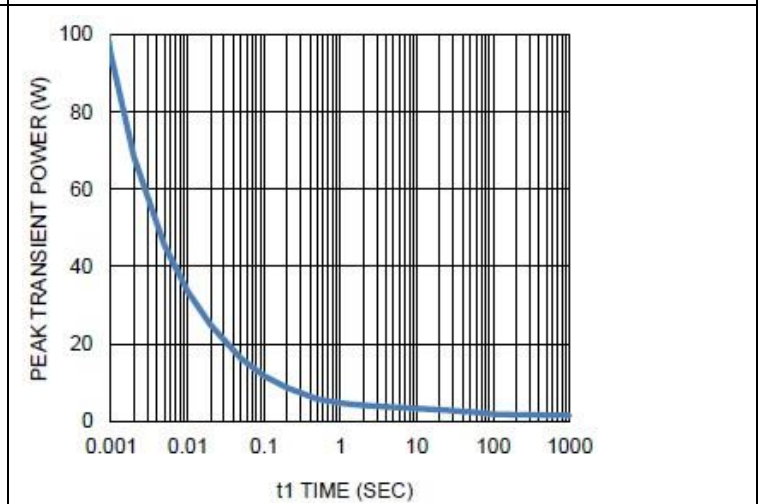


FIG. 10-SINGLE PULSE MAXIMUM POWER DISSIPATION

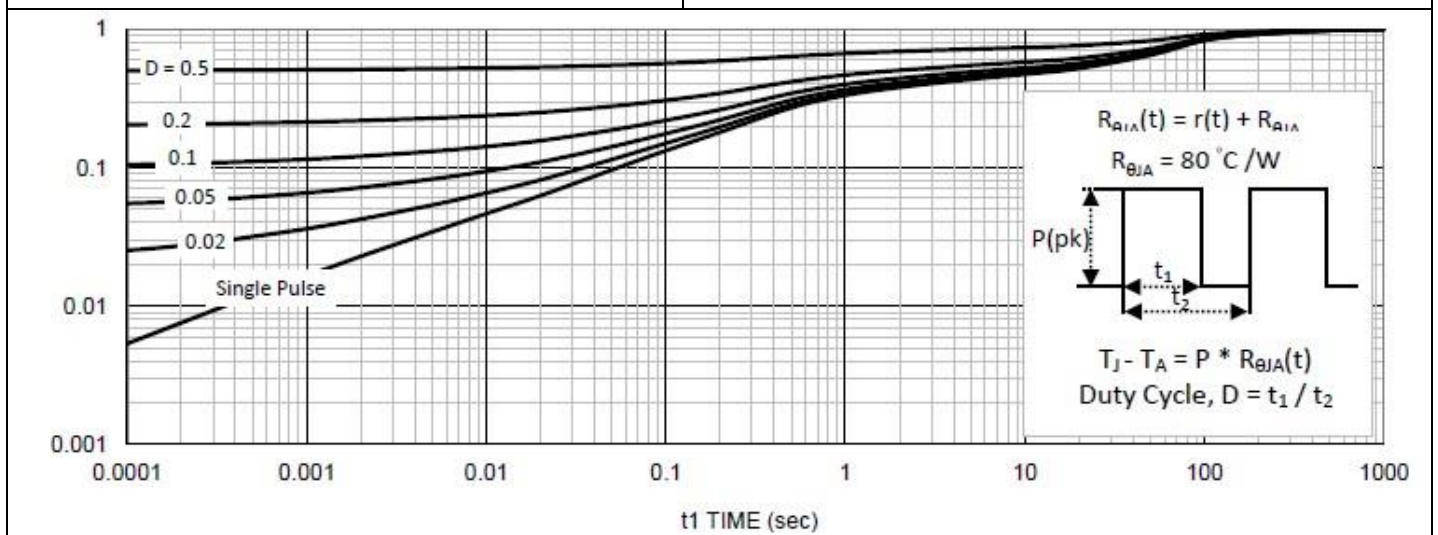


FIG. 11-NORMALIZED THERMAL TRANSIENT JUNCTION TO AMBIENT

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#### Disclaimer

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