

MSF2N40

400V N-Channel MOSFET

Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	°C
TPKG	Maximum Temperature for Soldering @ Package Body for 10 seconds	260	°C
P_D	Total Power Dissipation (@TC = 25 °C) 44 W	24	W
	Derating Factor above 25 °C	0.3	W/°C
T_{STG}	Operating and Storage Temperature Range	-55 to +150	°C
T_J	Storage Temperature	150	°C

Note:

1. Repetitive rating; pulse width limited by maximum junction temperature.
2. $I_{AS}=5.5A$, $V_{DD}=50V$, $L=8mH$, $V_G=10V$, starting $T_J=+25°C$.
3. $I_{SD} \leq 5.5A$, $di/dt \leq 100A/\mu s$, $V_{DD} \leq BVDSS$, starting $T_J=+25°C$.

Thermal characteristics (Tc=25°C unless otherwise noted)

Symbol	Parameter	Max.	Units
R_{thjc}	Typical thermal resistance	2.87	°C/W
$R_{\theta JA}$	Typical thermal resistance	62.5	

* When mounted on the minimum pad size recommended (PCB Mount)

Static Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
V_{GS}	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	--	4.0	V
* $R_{DS(ON)}$	$V_{GS} = 10 V, I_D = 1.0 A$	--	1.0	1.5	Ω
BV_{DSS}	$V_{GS} = 0 V, I_D = 250\mu A$	400	--	--	V
$\Delta BV_{DSS}/\Delta T_J$	$I_D = 250\mu A$, Referenced to 25°C	--	0.4	--	
I_{DSS}	$V_{DS} = 400 V, V_{GS} = 0 V$	--	--	1	μA
	$V_{DS} = 320 V, V_{GS} = 0 V, T_C = 125°C$	--	--	10	
I_{GSSF}	$V_{GS} = 30 V, V_{DS} = 0 V$	--	--	100	nA
I_{GSSR}	$V_{GS} = -30 V, V_{DS} = 0 V$	--	--	-100	nA

Dynamic Characteristics

Symbol	Test Conditions	Min	Typ.	Max.	Units
C_{ISS}	$V_{DS} = 25 V, V_{GS} = 0 V,$ $f = 1.0MHz$	--	670	870	pF
C_{OSS}		--	95	125	pF
C_{RSS}		--	16	21	pF

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Dynamic Characteristics					
Symbol	Test Conditions	Min	Typ.	Max.	Units
$t_{d(on)}$	$V_{DS} = 200\text{ V}, I_D = 5.5\text{ A},$ $R_G = 25\ \Omega$	--	20	50	ns
t_r		--	50	110	ns
$t_{d(off)}$		--	90	190	ns
t_f		--	55	120	ns
Q_g	$V_{DS} = 320\text{ V}, I_D = 5.5\text{ A},$ $V_{GS} = 10\text{ V}$	--	25	33	nC
Q_{gs}		--	5.0	--	
Q_{gd}		--	10.0	--	

Source-Drain Diode Characteristics					
Symbol	Test Conditions	Min	Typ.	Max.	Units
I_S		--	--	2	A
I_{SM}		--	--	2.5	
V_{SD}	$I_S = 2\text{ A}, V_{GS} = 0\text{ V}$	--	--	1.5	V
t_{rr}	$I_S = 2\text{ A}, V_{GS} = 0\text{ V}$ $diF/dt = 100\text{ A}/\mu\text{s}$	--	220	--	ns
Q_{rr}		--	2	--	μC

Notes;

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $I_{AS}=2\text{A}, V_{DD}=50\text{V}, R_G=25\text{W},$ Starting $T_J=25^\circ\text{C}$
3. $I_{SD}\leq 2\text{A}, di/dt\leq 300\text{A}/\mu\text{s}, V_{DD}\leq BV_{DSS},$ Starting $T_J=25^\circ\text{C}$
4. Pulse Test: Pulse Width $\leq 300\mu\text{s},$ Duty Cycle $\leq 2\%$
5. Essentially Independent of Operating Temperature

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Characteristics Curve

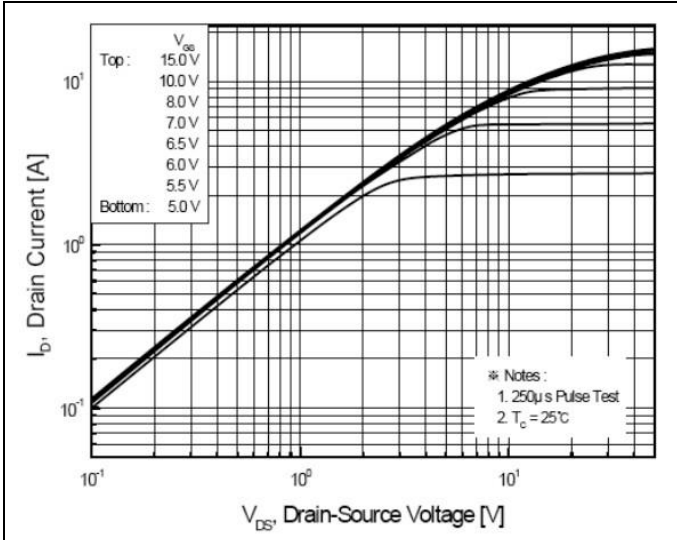


FIG.1-ON REGION CHARACTERISTICS

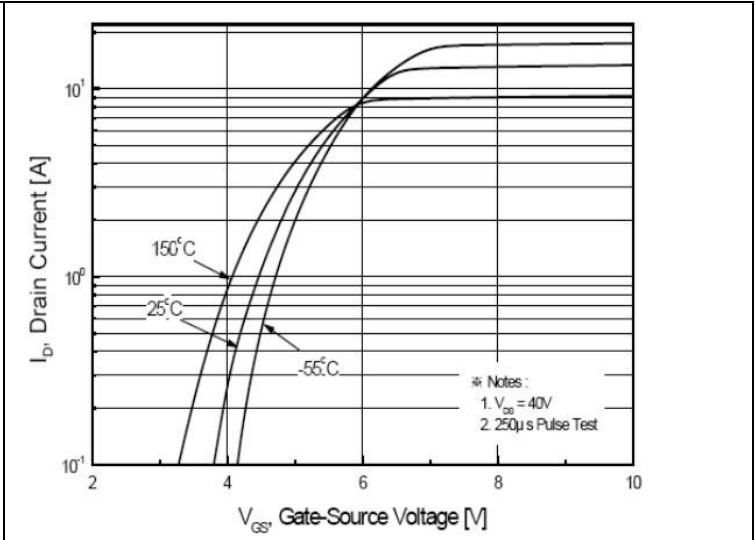


FIG.2-TRANSFER CHARACTERISTICS

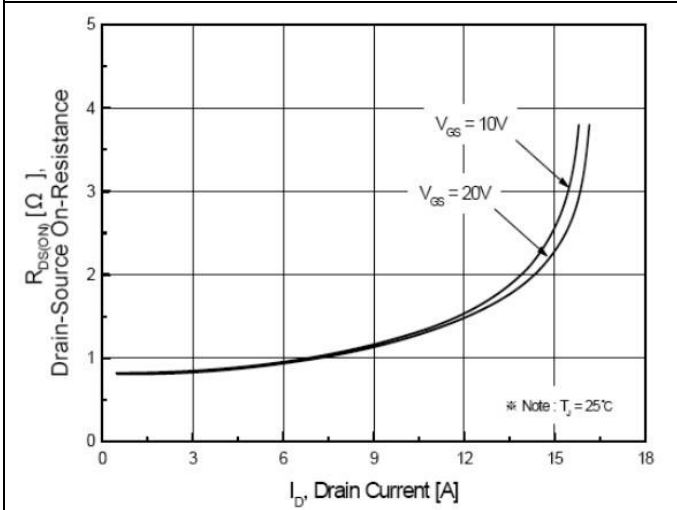


FIG.3-ON RESISTANCE VARIATION VS DRAIN CURRENT AND GATE VOLTAGE

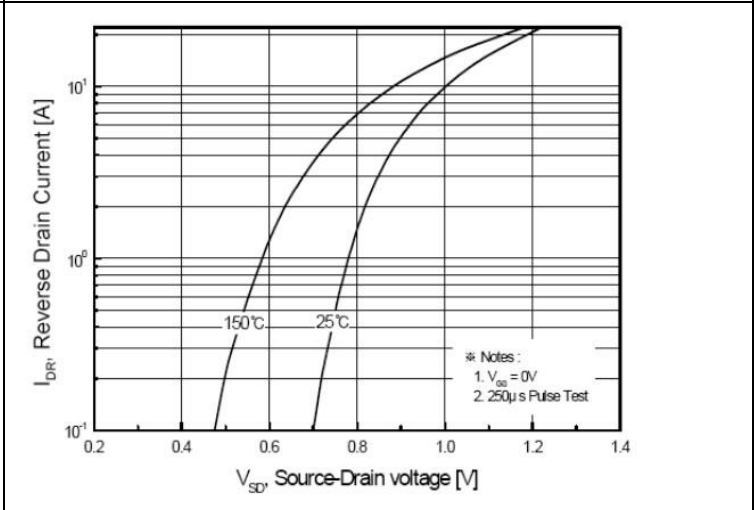


FIG.4-BODY DIODE FORWARD VOLTAGE VARIATION WITH SOURCE CURRENT AND TEMPERATURE

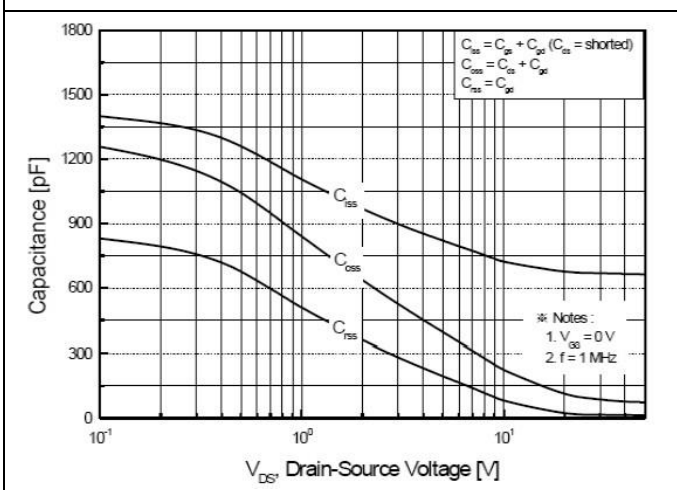


FIG.5-CAPACITANCE CHARACTERISTICS

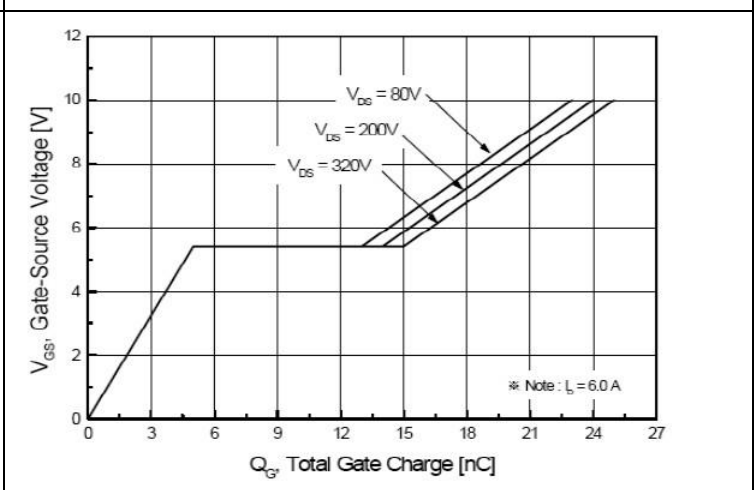


FIG.6-GATE CHARGE CHARACTERISTICS

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■ Characteristics Curve

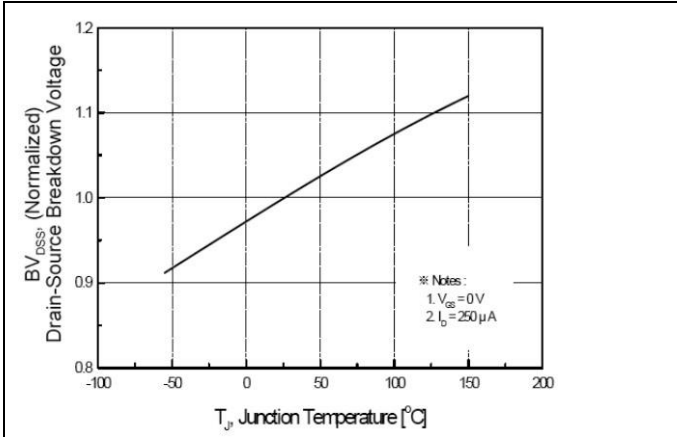


FIG.7-BREAKDOWN VOLTAGE VARIATION VS TEMPERATURE

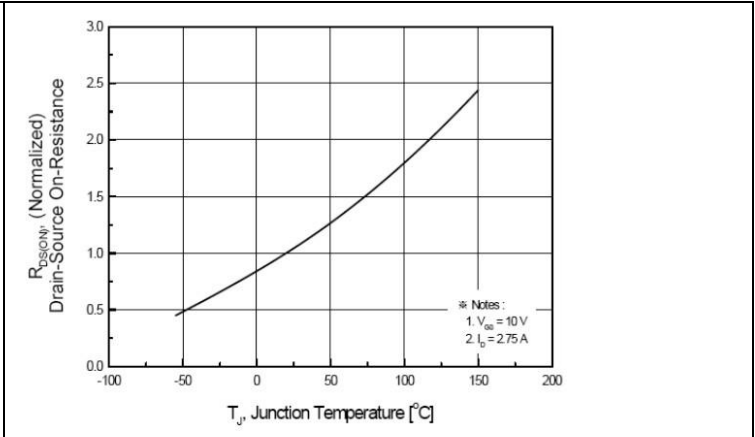


FIG.8-ON-RESISTANCE VARIATION VS TEMPERATURE

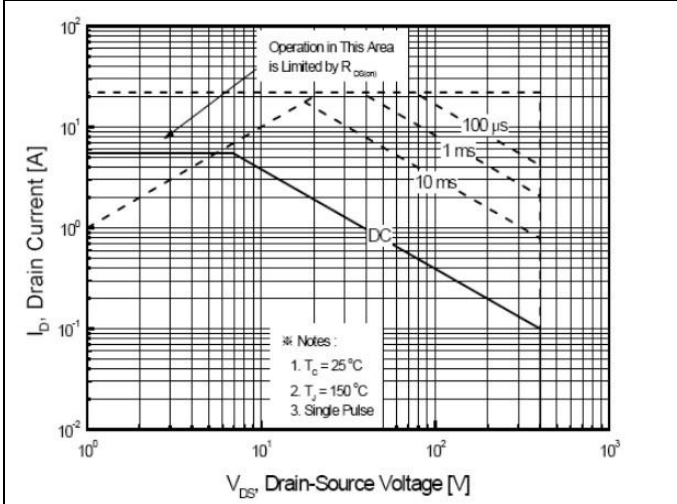


FIG.9-MAXIMUM SAFE OPERATING AREA

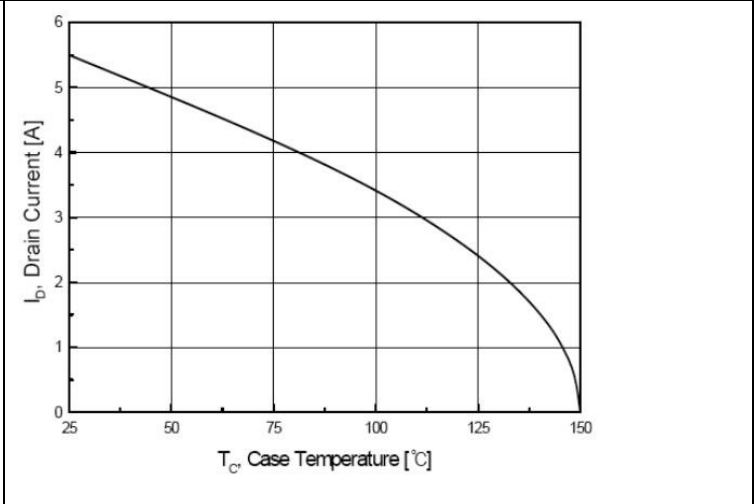


FIG.10-MAXIMUM DRAIN CURRENT VS CASE TEMPERATURE

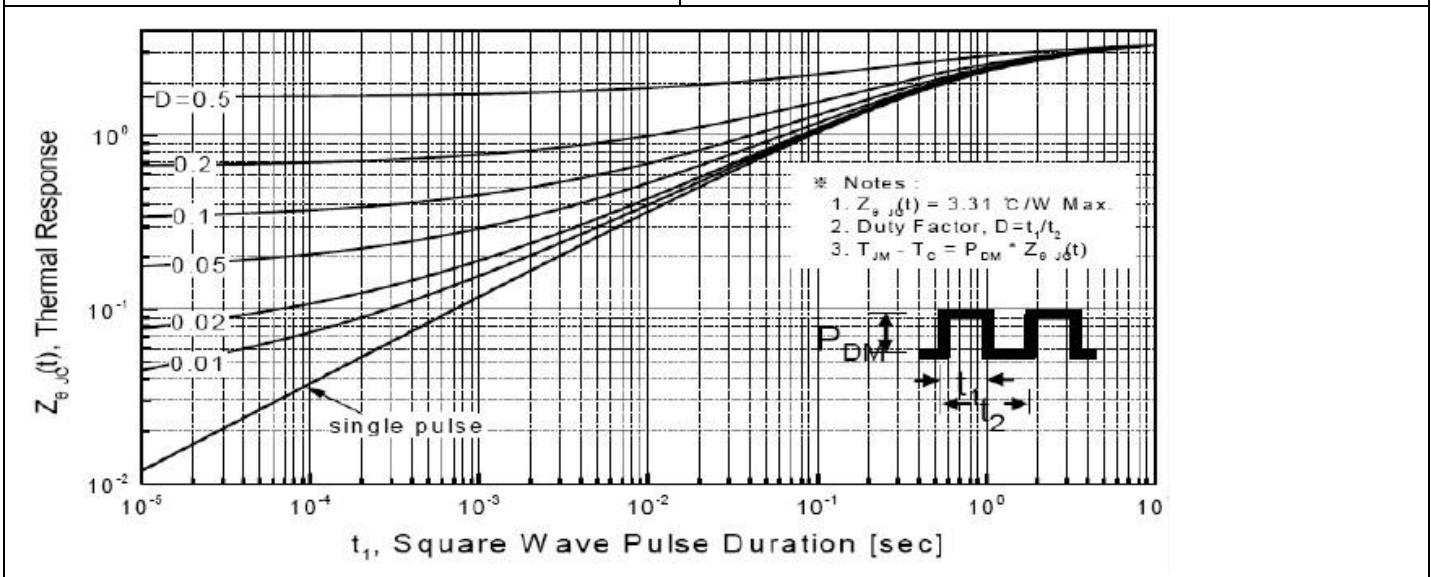


FIG.11-TRANSIENT THERMAL RESPONSE CURVE

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