# N-Channel Enhancement Mode Power MOSFET

Description

The G50N03J uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

General Features

- V_{DS} 30V
- I_D (at V_{GS} = 10V) 65A
- $R_{DS(ON)}$ (at V_{GS} = 10V) < 7mΩ
- $R_{DS(ON)}$ (at V_{GS} = 4.5V) < 12mΩ
- 100% Avalanche Tested
- RoHS Compliant

Application

- Power switch
- DC/DC converters
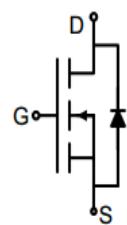
Schematic diagram

TO-251

Device	Package	Marking	Packaging
G50N03J	TO-251	G50N03	75pcs/Tube

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	30	V
Continuous Drain Current	I_D	65	A
Pulsed Drain Current (note1)	I_{DM}	260	A
Gate-Source Voltage	V_{GS}	±20	V
Power Dissipation	P_D	48	W
Single pulse avalanche energy （note3）	E_{AS}	43	mJ
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 To 150	ºC

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	R_{thJC}	2.59	ºC/W

Specifications $T_J = 25^oC$, unless otherwise noted

| Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V$, $I_D = 250\mu A$	30	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 30V$, $V_{GS} = 0V$	--	--	1	μA
Gate-Source Leakage	I_{GSS}	$V_{GS} = \pm20V$	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\mu A$	1	1.45	2.5	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V$, $I_D = 20A$	--	5.0	7	mΩ
		$V_{GS} = 4.5V$, $I_D = 15A$	--	7.2	12	
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=20A$	--	33	--	S
Dynamic Parameters						
Input Capacitance	C_{iss}	$V_{GS} = 0V$, $V_{DS} = 15V$, $f = 1.0MHz$	--	1255	--	pF
Output Capacitance	C_{oss}		--	232	--	
Reverse Transfer Capacitance	C_{rss}		--	185	--	
Total Gate Charge	Q_g	$V_{DD} = 10V$, $I_D = 20A$, $V_{GS} = 10V$	--	16.6	--	nC
Gate-Source Charge	Q_{gs}		--	3.6	--	
Gate-Drain Charge	Q_{gd}		--	3	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{DD} = 15V$, $I_D = 20A$, $R_G = 1.8\Omega$	--	10	--	ns
Turn-on Rise Time	t_r		--	8	--	
Turn-off Delay Time	$t_{d(off)}$		--	30	--	
Turn-off Fall Time	t_f		--	5	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	$T_C = 25^oC$	--	--	65	A
Body Diode Voltage	V_{SD}	$T_J = 25^oC$, $I_{SD} = 30A$, $V_{GS} = 0V$	--	--	1.2	V

Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature

2. Identical low side and high side switch with identical R_G

3. EAS condition : Tj=25℃ ,VDD=30V,VGS=10V,L=0.5mH,Rg=25Ω

Gate Charge Test Circuit
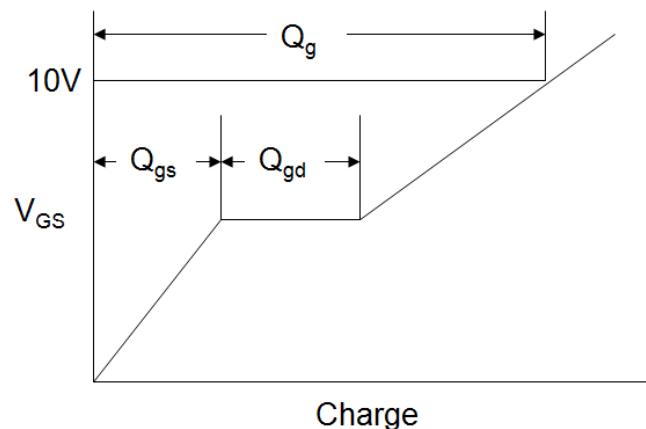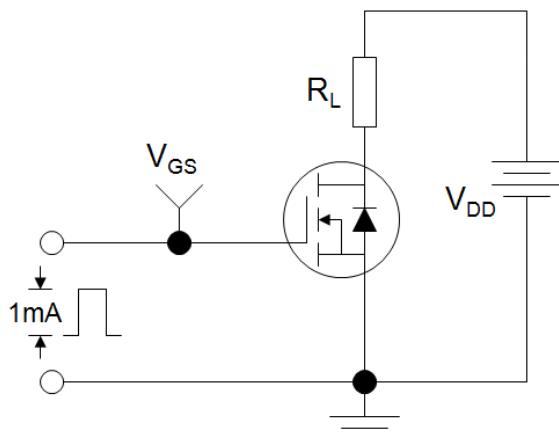
Switch Time Test Circuit
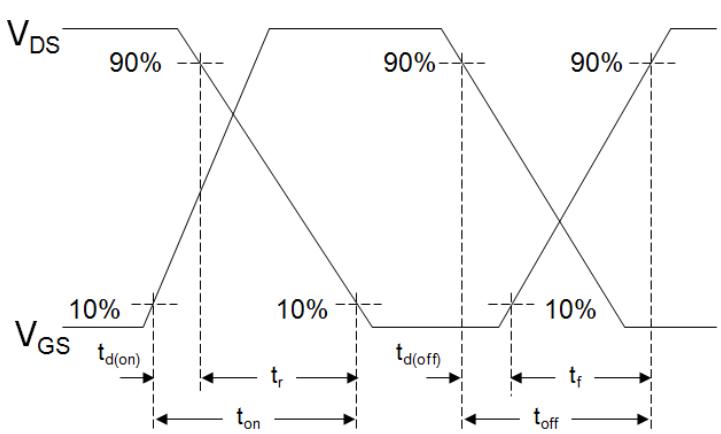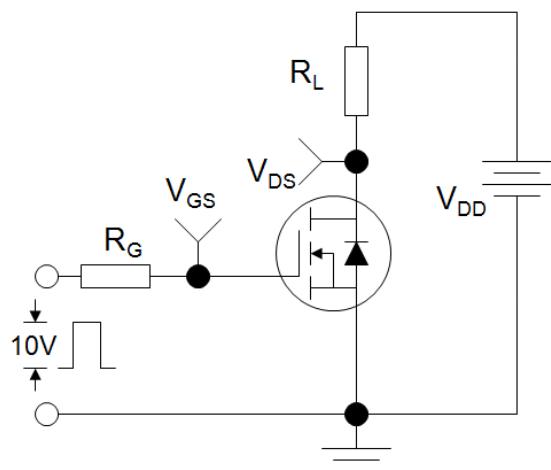
EAS Test Circuit
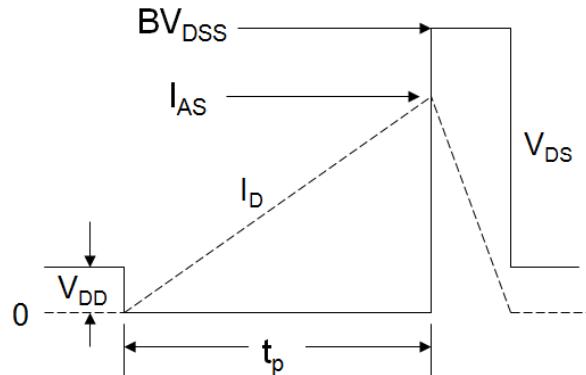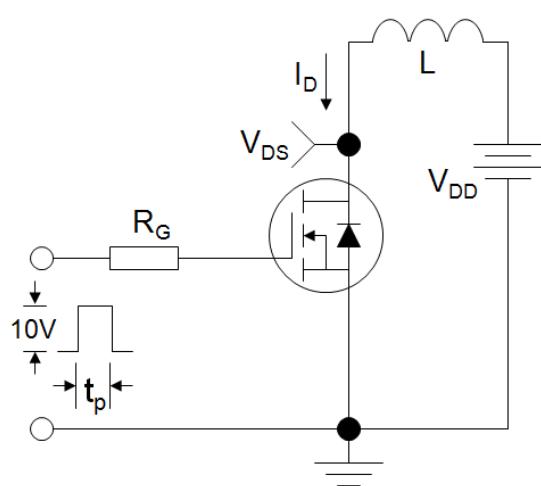
Typical Characteristics $T_J = 25^oC$, unless otherwise noted

### Figure 1. Output Characteristics
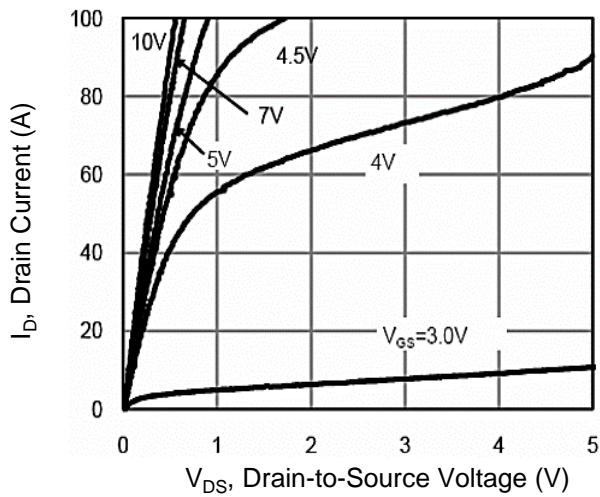
### Figure 2. Transfer Characteristics
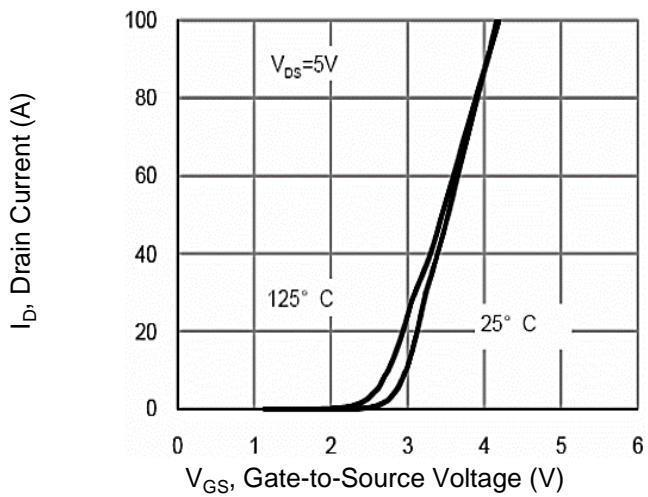

Figure 3. Gate Charge
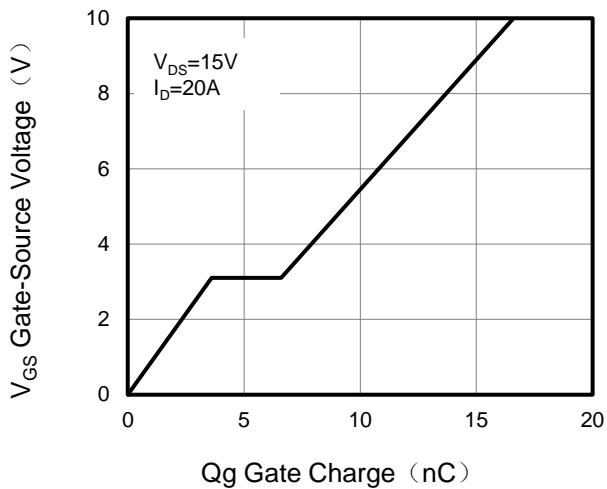
Figure 4. Drain Source On Resistance
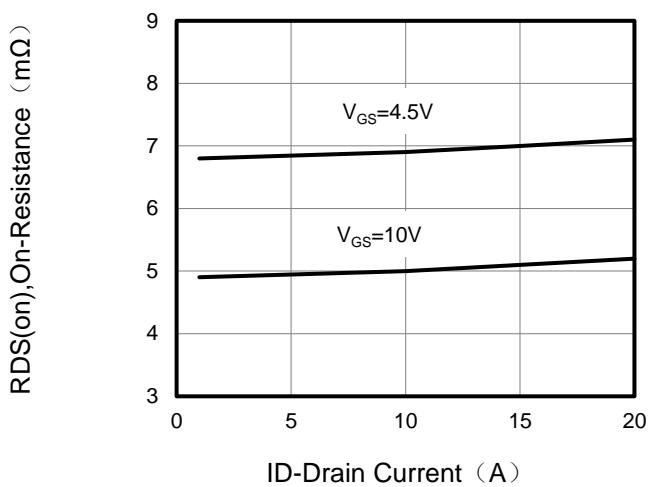

Figure 5. Capacitance
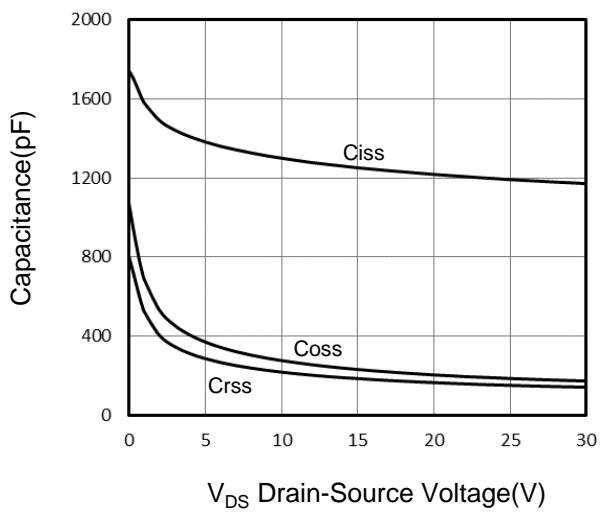
Figure 6. Source-Drain Diode Forward
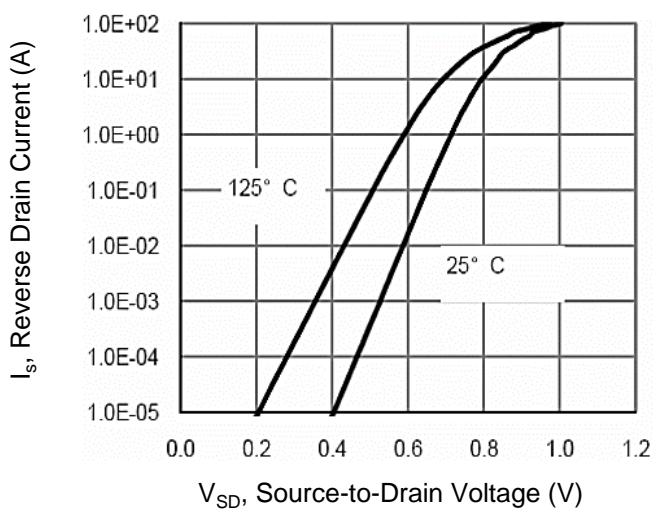
Typical Characteristics $T_J = 25^oC$, unless otherwise noted

Figure 7. Drain-Source On-Resistance

$V_{GS}=10V$
$ID = 20A$

$R_{DS(on)}$, (Normalized)

T_J, Junction Temperature (ºC)
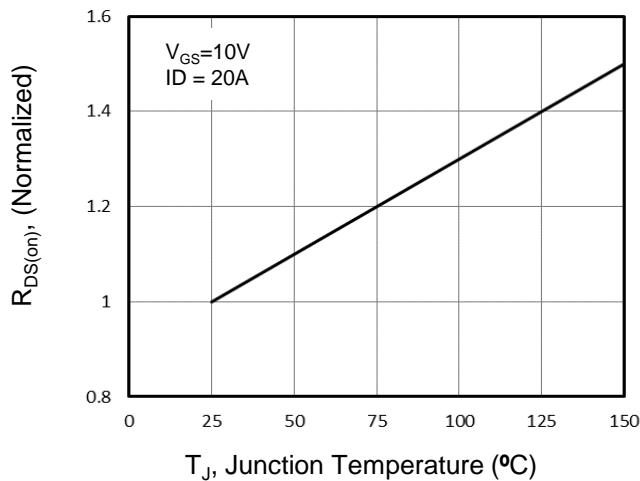
Figure 8. Safe Operation Area

$R_{DS(ON)}$ limited

$10\mu s$
$100\mu s$
$1ms$
$10ms$

DC

$T_{J(Max)}=150^\circ C$

I_D, Drain Current(A)

V_{DS}, Drain-Source Voltage(V)
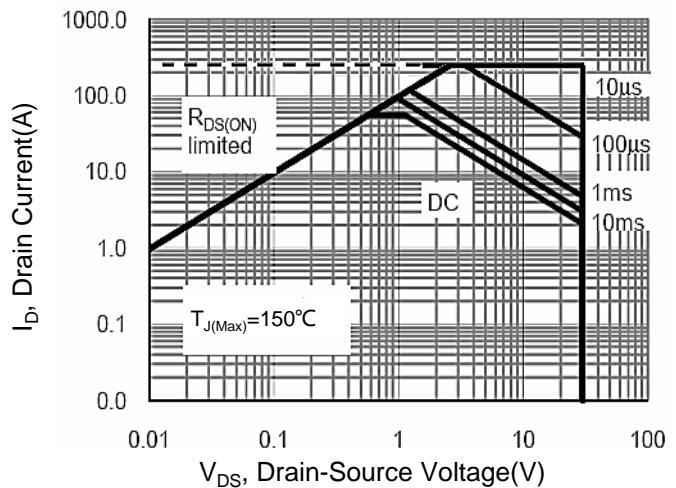
Figure 9. Normalized Maximum Transient Thermal Impedance

$D=T_{on}/T$
$T_{J,PK}=T_C+P_{DM}.Z_{\theta JC}.R_{\theta JC}$

In descending order
D=0.5, 0.3, 0.1, 0.05, 0.02, 0.01, single pulse

Single Pulse

Z_{thJC}, Thermal Impedance (ºC/W)

Pulse Width (s)
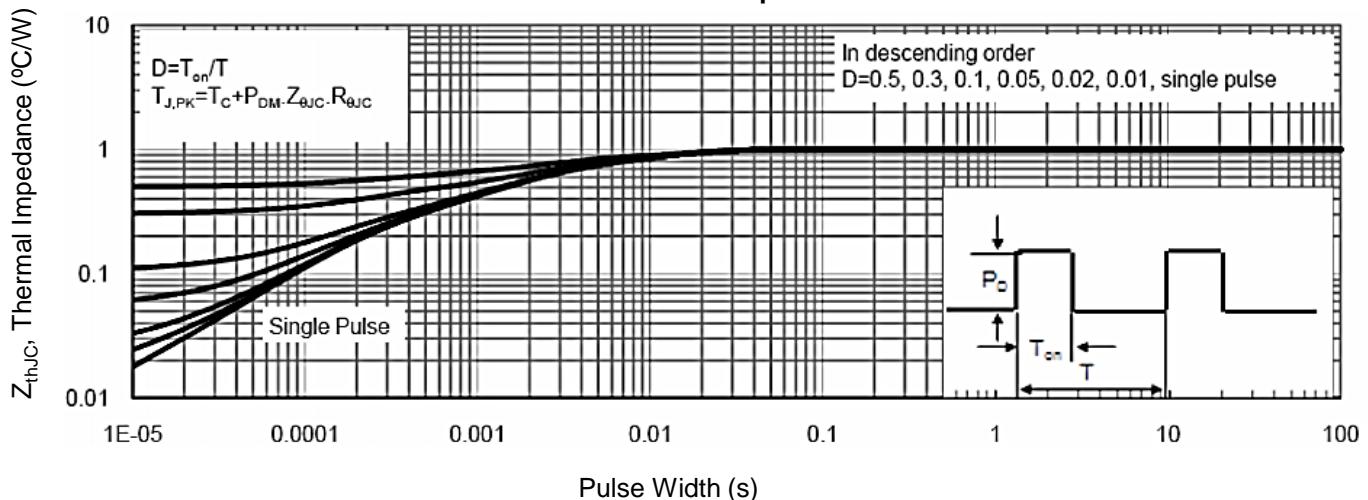
TO-251 Package information
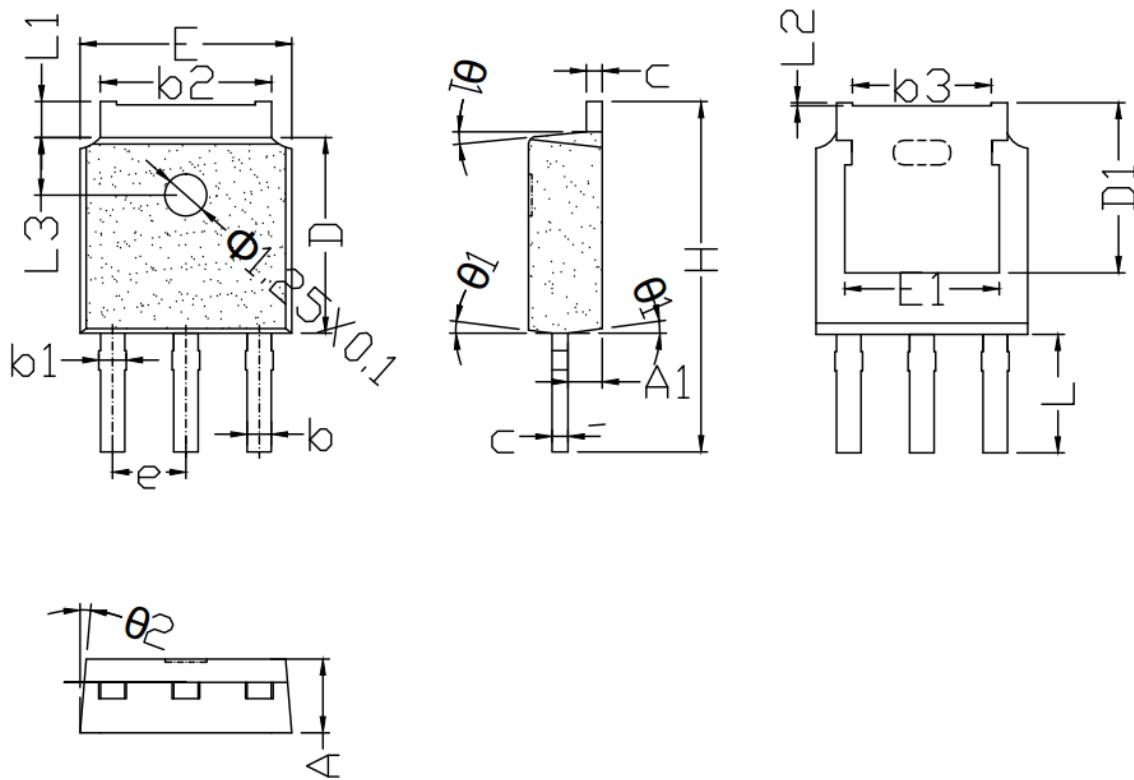
COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
*A	2.20	2.30	2.38
*A1	0.90	1.00	1.10
*b	0.72	0.78	0.85
*b1	0.78	0.85	0.90
b2	5.23	5.33	5.46
b3	4.27	4.32	4.37
*c	0.47	0.52	0.55
*D	6.00	6.10	6.20
D1	5.40REF		
*E	6.50	6.60	6.70
E1	4.70	4.83	4.92
*e	2.286BSC		
*H	9.90	10.10	10.20
*L	3.60	3.70	3.80
L1	0.90	—	1.20
L2	0.02	0.04	0.08
L3	1.70	1.80	1.90
01	$\pm$°	F°	9°
02	$\pm$°	F°	9°