

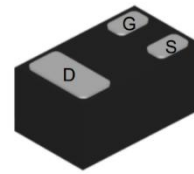
N-Channel Enhancement Mode MOSFET

Features

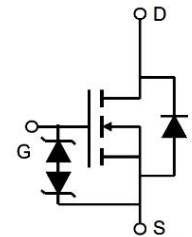
- ESD Protected up to 2KV (HBM)
- Low Threshold Voltage
- Fast Switching Speed
- Halogen-Free & Lead-Free
- Advanced Trench Process Technology



Top View

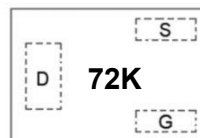


Bottom View



Application

- Load Switch for Portable Devices
- Voltage controlled small signal switch



DFN1006-3L

Marking: 72K

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	0.34	A
Peak Drain Current, Pulsed ¹⁾	I_{DM}	1.8	A
Power Dissipation ²⁾	P_{tot}	0.71	W
Operating Junction	T_J	-55~150	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-55~150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Ambient ²⁾	$R_{\theta JA}$	175	$^\circ\text{C/W}$

Note:

¹⁾ Pulse width $\leq 100\mu\text{s}$, duty cycle $\leq 1\%$, limited by T_{jmax} .

²⁾ Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate in still air.

Characteristics at $T_a = 25^\circ\text{C}$ unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at $I_D = 250\ \mu\text{A}$	BV_{DSS}	60			V
Drain-Source Leakage Current at $V_{DS} = 60\ \text{V}$, $V_{GS} = 0\ \text{V}$	I_{DSS}			1	μA
Gate Leakage Current at $V_{GS} = \pm 20\ \text{V}$	I_{GSS}			± 10	μA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{A}$	$V_{GS(th)}$	1		2	V
Drain-Source On-State Resistance at $V_{GS} = 10\ \text{V}$, $I_D = 300\ \text{mA}$ at $V_{GS} = 4.5\ \text{V}$, $I_D = 200\ \text{mA}$	$R_{DS(on)}$		1.6 2	3 5	Ω
DYNAMIC PARAMETERS					
Gate resistance at $V_{DS} = 0\ \text{V}$, $V_{GS} = 0\ \text{V}$, $f = 1\ \text{MHz}$	R_g		2		Ω
Forward Trans conductance at $V_{DS} = 10\ \text{V}$, $I_D = 200\ \text{mA}$	g_{fs}		307		S
Input Capacitance at $V_{DS} = 10\ \text{V}$, $V_{GS} = 0\ \text{V}$, $f = 1\ \text{MHz}$	C_{iss}		31		pF
Output Capacitance at $V_{DS} = 10\ \text{V}$, $V_{GS} = 0\ \text{V}$, $f = 1\ \text{MHz}$	C_{oss}		11		pF
Reverse Transfer Capacitance at $V_{DS} = 10\ \text{V}$, $V_{GS} = 0\ \text{V}$, $f = 1\ \text{MHz}$	C_{rss}		3		pF
Gate charge total at $V_{DS} = 30\ \text{V}$, $I_D = 1\ \text{A}$, $V_{GS} = 10\ \text{V}$	Q_g		1.3		nC
Gate to Source Charge at $V_{DS} = 30\ \text{V}$, $I_D = 1\ \text{A}$, $V_{GS} = 10\ \text{V}$	Q_{gs}		0.5		nC
Gate to Drain Charge at $V_{DS} = 30\ \text{V}$, $I_D = 1\ \text{A}$, $V_{GS} = 10\ \text{V}$	Q_{gd}		0.2		nC
Turn-On Delay Time at $V_{DD} = 30\ \text{V}$, $I_D = 1\ \text{A}$, $R_g = 6.8\ \Omega$, $V_{GS} = 10\ \text{V}$	$t_{d(on)}$		4.8		nS
Turn-On Rise Time at $V_{DD} = 30\ \text{V}$, $I_D = 1\ \text{A}$, $R_g = 6.8\ \Omega$, $V_{GS} = 10\ \text{V}$	t_r		3		nS
Turn-Off Delay Time at $V_{DD} = 30\ \text{V}$, $I_D = 1\ \text{A}$, $R_g = 6.8\ \Omega$, $V_{GS} = 10\ \text{V}$	$t_{d(off)}$		4.4		nS
Turn-Off Fall Time at $V_{DD} = 30\ \text{V}$, $I_D = 1\ \text{A}$, $R_g = 6.8\ \Omega$, $V_{GS} = 10\ \text{V}$	t_f		15		nS
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at $I_S = 115\ \text{mA}$, $V_{GS} = 0\ \text{V}$	V_{SD}			1.1	V
Body Diode Reverse Recovery Time at $I_S = 1\ \text{A}$, $di/dt = -100\ \text{A} / \mu\text{s}$	t_{rr}		8.4		nS
Body Diode Reverse Recovery Charge At $I_S = 1\ \text{A}$, $di/dt = -100\ \text{A} / \mu\text{s}$	Q_{rr}		3.6		nC

Electrical Characteristics Curves

Fig.1 Output Characteristic

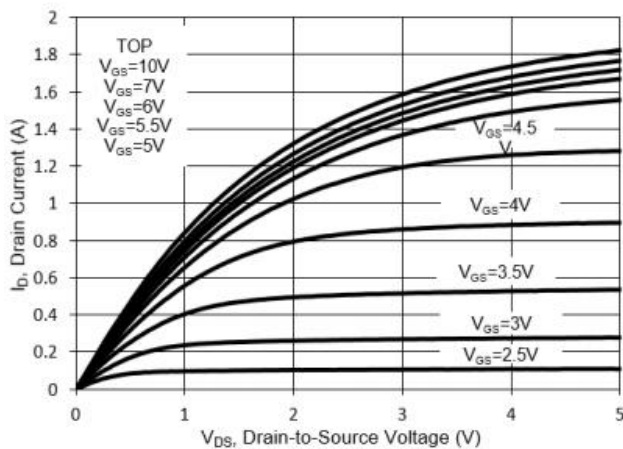


Fig.2 Transfer Characteristic

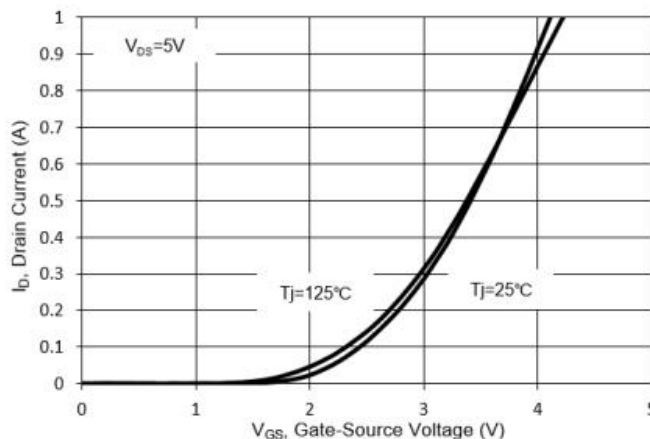


Fig.3 On Resistance vs. Gate-Source

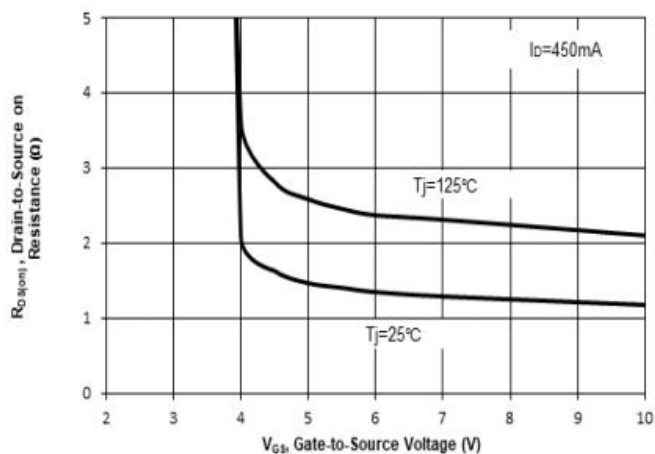


Fig.4 On Resistance vs. Temperature

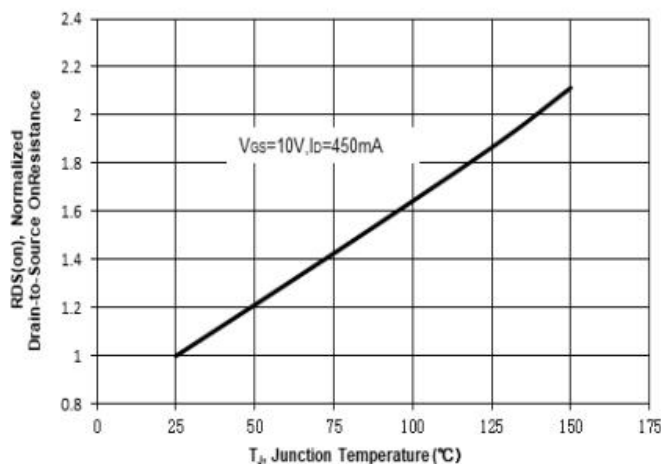


Fig.5 on Resistance vs. Drain Current

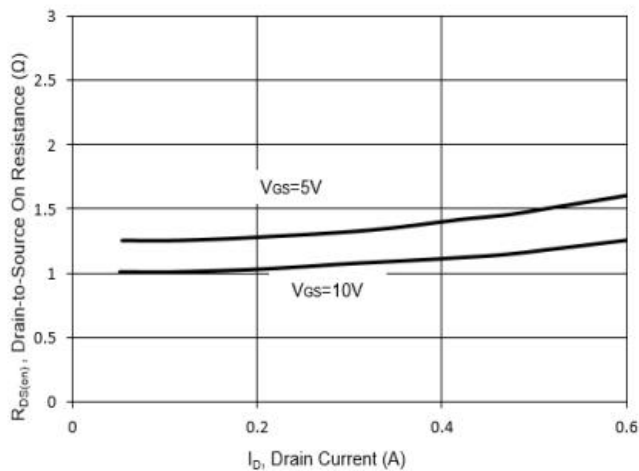
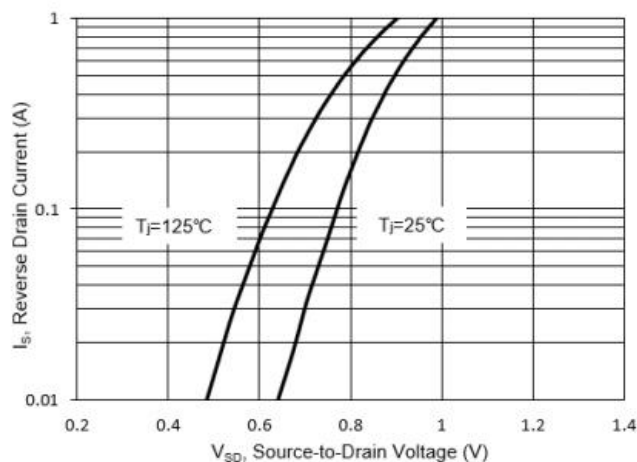


Fig.6 Source-Drain Diode Forward



Electrical Characteristics Curves

Fig.7 Drain Leakage Current vs. T_J

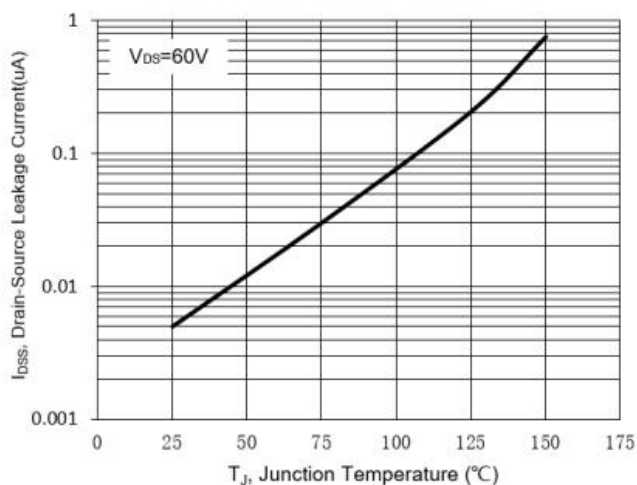


Fig.8 Drain-Source Breakdown Voltage vs. T_J

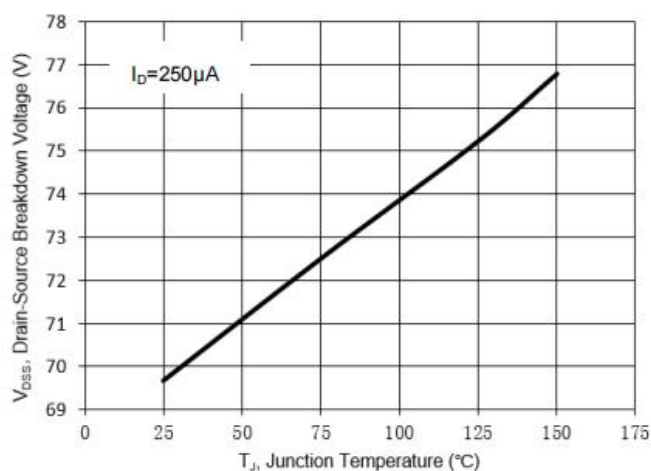


Fig.9 Gate-Source Threshold Voltage vs. T_J

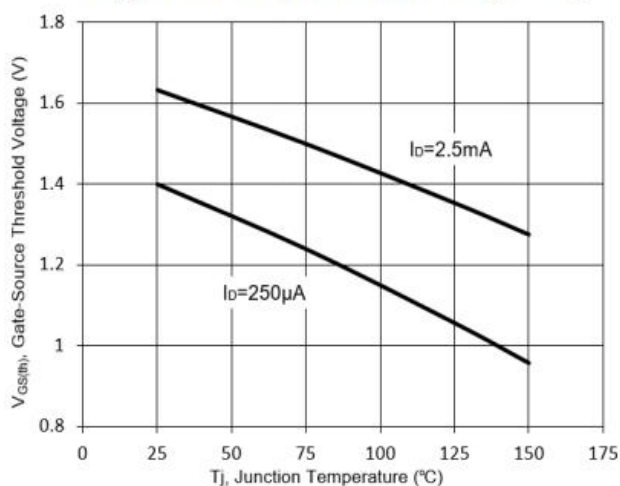


Fig.10 Capacitance Characteristic

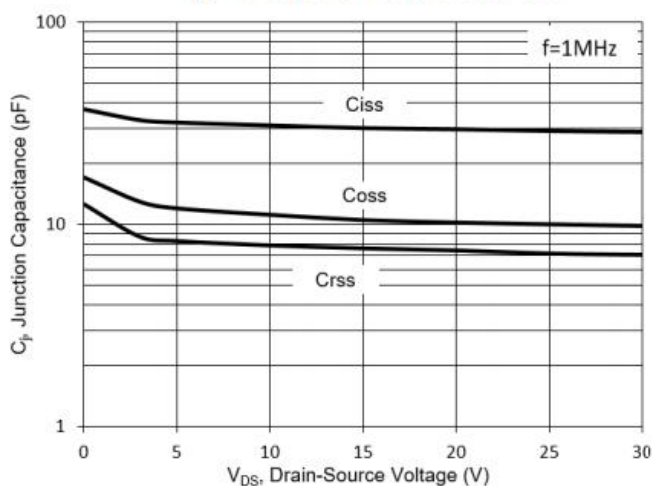
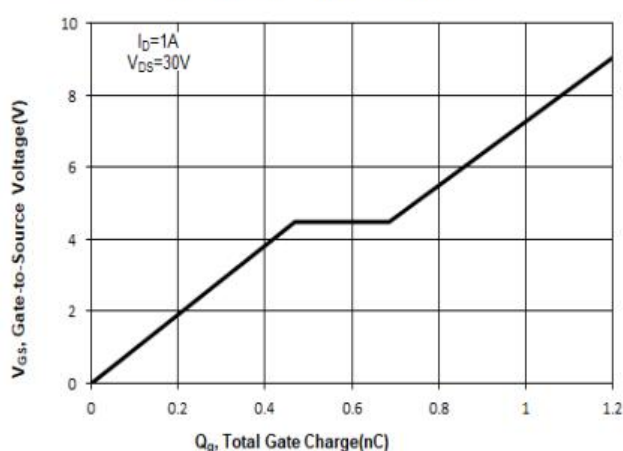


Fig.11 Gate Charge Characteristic



Test Circuits

Fig.1-1 Switching times test circuit

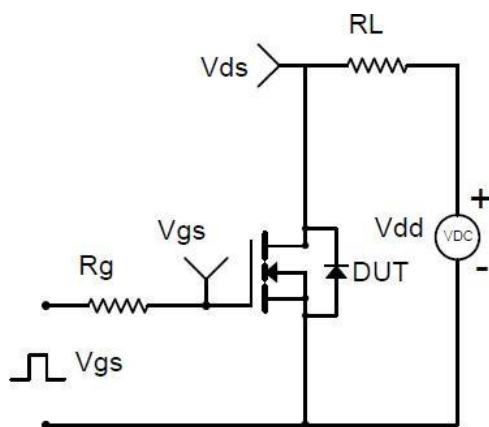


Fig.1-2 Switching Waveform

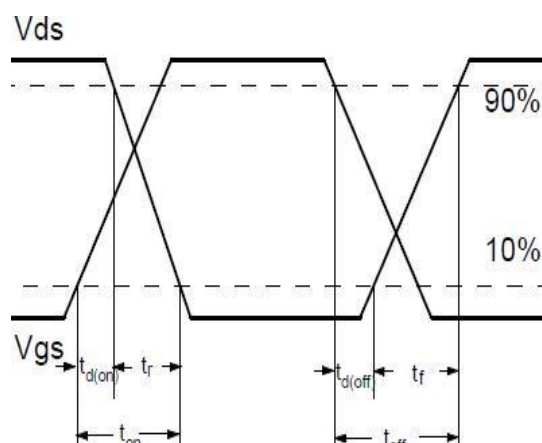


Fig.2-1 Gate charge test circuit

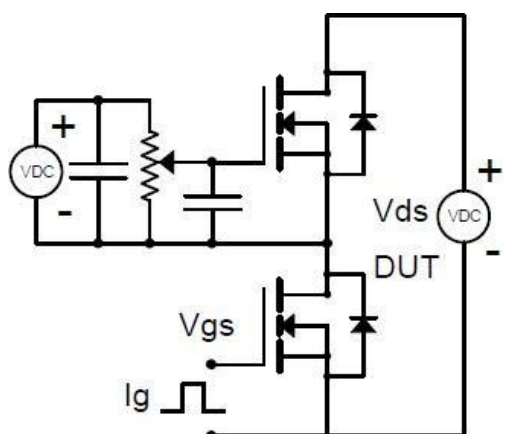


Fig.2-2 Gate charge waveform

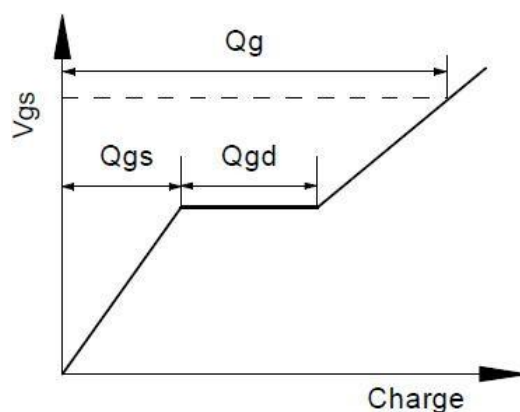


Fig.3-1 Avalanche test circuit

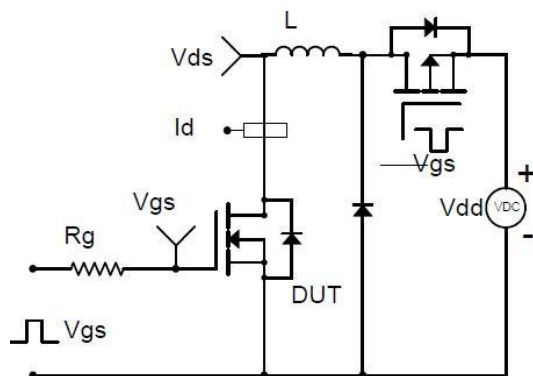
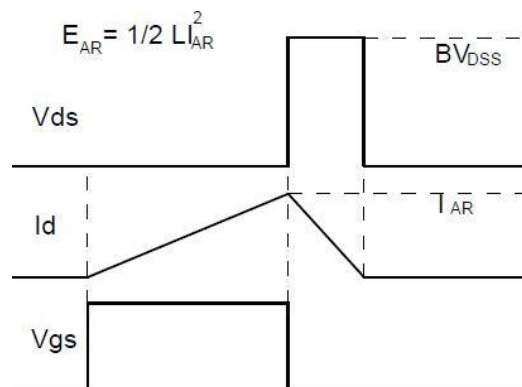
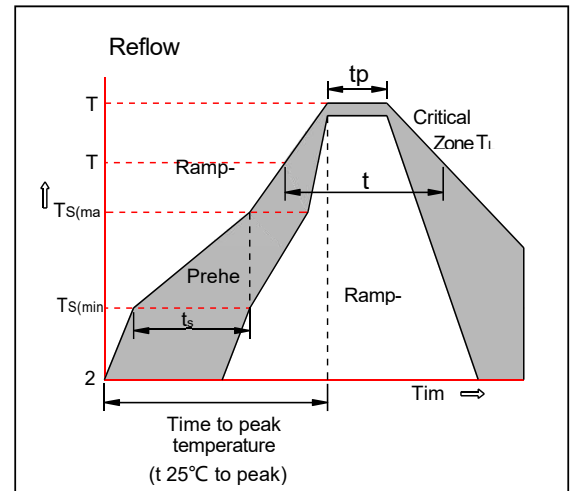


Fig.3-2 Avalanche waveform



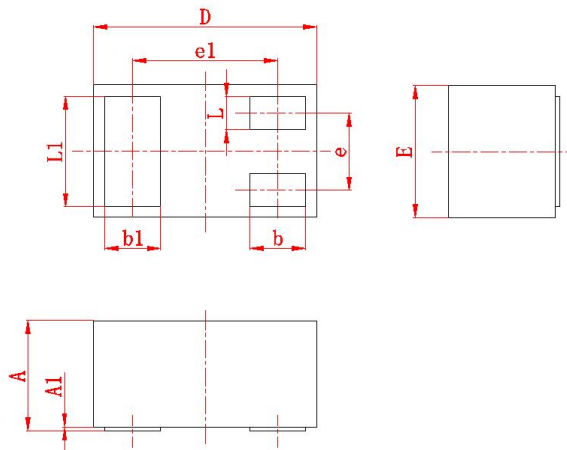
Soldering parameters

Reflow Condition		Pb-Free assembly (see as below)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150°C
	-Temperature Max($T_{s(max)}$)	+200°C
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3°C/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3°C/sec. Max
Reflow	-Temperature(T_L)(Liquid us)	+217°C
	-Temperature(t_L)	60-150 secs.
Peak Temp (T_P)		+260(+0/-5)°C
Time within 5°C of actual Peak Temp (t_p)		30 secs. Max
Ramp-down Rate		6°C/sec. Max
Time 25°C to Peak Temp (T_P)		8 min. Max
Do not exceed		+260°C



Package Outline Dimensions (Units: mm)

DFN1006-3L



符号	尺寸		符号	尺寸		符号	尺寸	
	Min	Max		Min	Max		Min	Max
A	0.4	0.5	e	(0.35)		L	0.1	0.2
A1	0	0.05	e1	(0.65)		L1	0.45	0.55
D	0.9	1.1	b	0.2	0.3			
E	0.55	0.65	b1	0.2	0.3			