

JMM5770N

Product Preview

40V 60A N-Channel MOSFET

Features

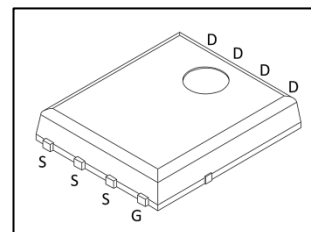
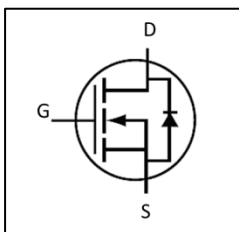
- Advanced shielded-gate technology
- Ultra-low on-resistance and gate-charge
- RoHS compliant



Product Summary	
V_{DS}	40V
$R_{DS(ON)}$	1.1m Ω (Typ.)
	1.4m Ω (Max.)
I_D	60A

Applications

- Motor controllers
- DC-to-DC convertors
- Battery-driven electronic products, electrical equipment and machines


Ordering Information

Part Number	Marking	Package	Packaging
JMM5770N	MM5770N	DFN5x6	Tape & Reel

Absolute Maximum Ratings

Parameter	Symbol	Limit	Unit
Drain-to-Source Voltage	V_{DS}	40	V
Gate-to-Source Voltage	V_{GS}	± 20	
Continuous Drain Current, Package Limited	I_D	60	A
Continuous Drain Current, Silicon Limited ($T_C = 25^\circ\text{C}$) ⁽¹⁾	I_D	219	
Continuous Drain Current, Silicon Limited ($T_C = 100^\circ\text{C}$) ⁽¹⁾	I_D	138	
Continuous Drain Current, Silicon Limited t ($T_A = 25^\circ\text{C}$) ^{(2), (3)}	I_D	34	
Continuous Drain Current, Silicon Limited ($T_A = 100^\circ\text{C}$) ^{(2), (3)}	I_D	22	
Pulsed Drain Current ⁽⁴⁾	I_{DM}	240	
Power Dissipation ($T_C = 25^\circ\text{C}$)	P_D	114	W
Linear Derating Factor	-	0.91	W/ $^\circ\text{C}$
Single Pulse Avalanche Energy ⁽⁵⁾	E_{AS}	238	mJ
Avalanche Current ⁽⁶⁾	I_{AS}	45	A
Junction Temperature	T_J	-55 to 150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-55 to 150	

Thermal Characteristics

Parameter	Symbol	Max	Unit
Junction-to-Ambient Thermal Resistance ⁽³⁾	$R_{\theta JA}$	45	$^\circ\text{C}/\text{W}$
Junction-to-Case Thermal Resistance	$R_{\theta JC}$	1.1	

Static Electrical Characteristics ⁽⁷⁾

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-to-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$	40	-	-	V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	1.0	-	2.0	
Drain-to-Source Leakage Current	I_{DSS}	$V_{DS} = 40\text{V}, V_{GS} = 0\text{V}$	-	-	1	μA
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$	-	-	± 100	nA
Drain-to-Source On-Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{V}, I_D = 20\text{A}$	-	1.1	1.4	m Ω
		$V_{GS} = 4.5\text{V}, I_D = 20\text{A}$	-	1.4	1.8	m Ω

Dynamic Electrical Characteristics ⁽⁷⁾

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Forward Transconductance	g_{fs}	$V_{DS} = 5V, I_D = 20A$	-	160	-	S
Total Gate Charge	Q_g	$V_{GS} = 4.5V,$ $V_{DS} = 20V,$ $I_D = 20A$	-	48	-	nC
Gate-to-Source Charge	Q_{gs}		-	13	-	
Gate-to-Drain Charge	Q_{gd}		-	20	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 4.5V,$ $V_{DS} = 20V,$ $I_D = 20A,$ $R_G = 3.0\Omega$	-	24	-	ns
Rise Time	t_r		-	84	-	
Turn-Off Delay Time	$t_{d(off)}$		-	62	-	
Fall Time	t_f		-	20	-	
Input Capacitance	C_{iss}	$V_{GS} = 0V,$ $f = 1MHz,$ $V_{DS} = 20V$	-	6015	-	pF
Output Capacitance	C_{oss}		-	2290	-	
Reverse Transfer Capacitance	C_{rss}		-	165	-	

Diode Characteristics ⁽⁷⁾

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Forward Voltage	V_{SD}	$V_{GS} = 0V, I_S = 50A$	-	0.8	-	V
Reverse Recovery Time	t_{rr}	$V_{GS} = 0V, I_S = 20A,$ $dI_S/dt = 100A/\mu s$	-	88	-	ns
Reverse Recovery Charge	Q_{rr}		-	185	-	nC

(1) Rated according to $R_{\theta JC}$

(2) Rated according to $R_{\theta JA}$

(3) Surface-mounted on 1 inch² FR4 board, 2 oz Cu

(4) Limited by maximum T_J

(5) Starting $T_J = 25^\circ C$, $L = 0.1mH$, $V_{DD} = 30V$, $V_{GS} = 10V$

(6) Pulse width limited by maximum T_J

(7) $T_J = 25^\circ C$ unless otherwise specified

Typical Electrical Characteristics

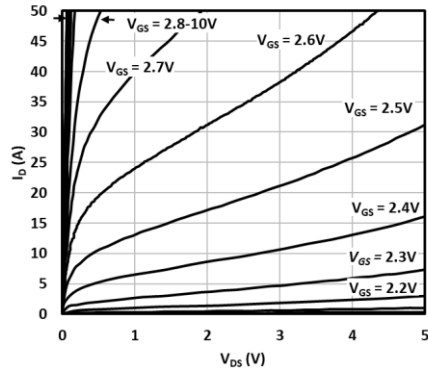


Fig. 1 Output characteristics

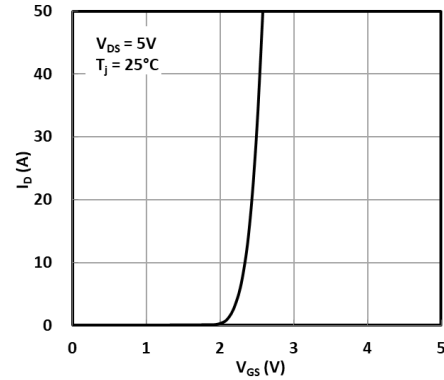


Fig. 2 Transfer characteristics

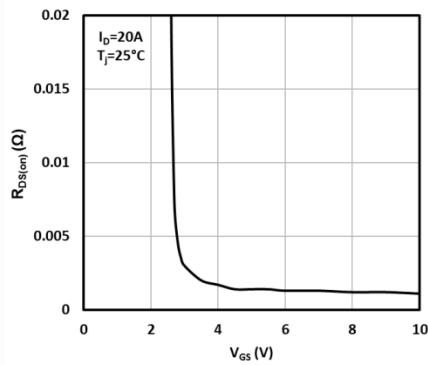


Fig.3 On-resistance vs. gate voltage

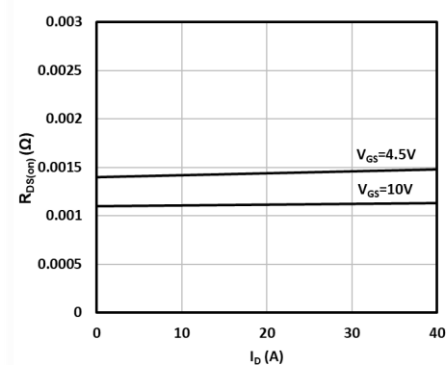


Fig.4 On-resistance vs. drain current

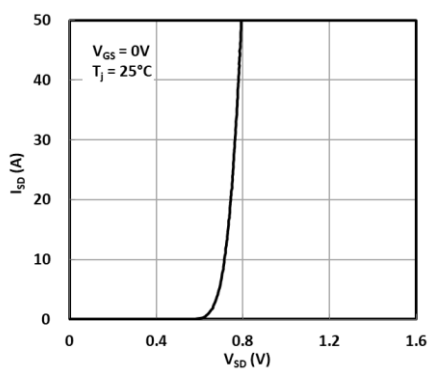


Fig.5 Source-to-drain diode forward characteristics

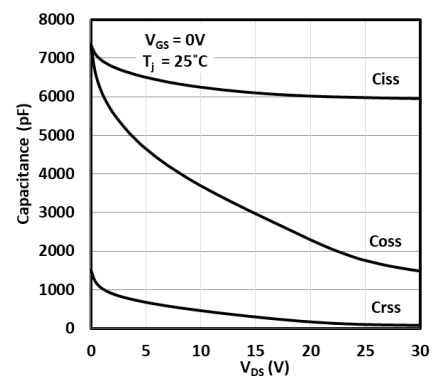


Fig.6 Capacitance vs. drain-to-source voltage

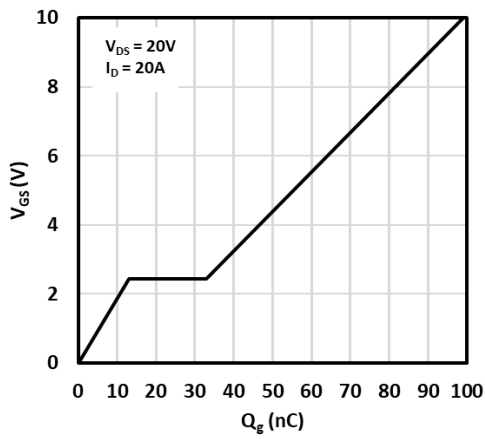


Fig.7 Gate-to-source voltage vs. gate charge

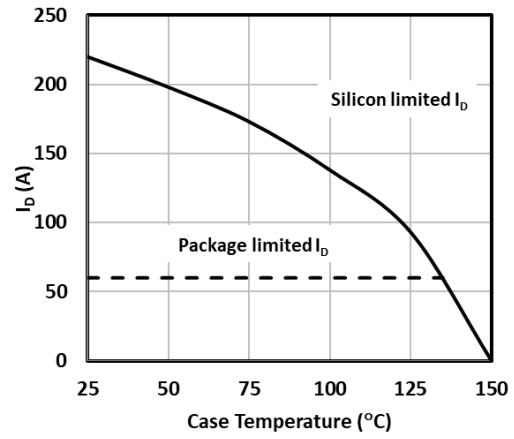


Fig.8 Maximum drain current vs. case temperature

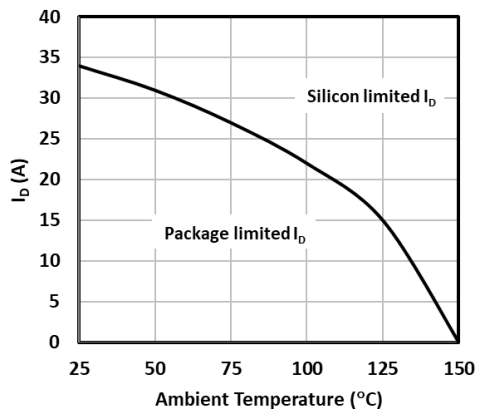
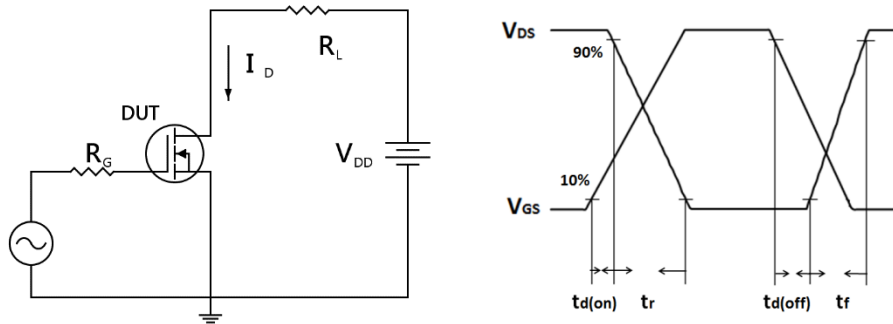
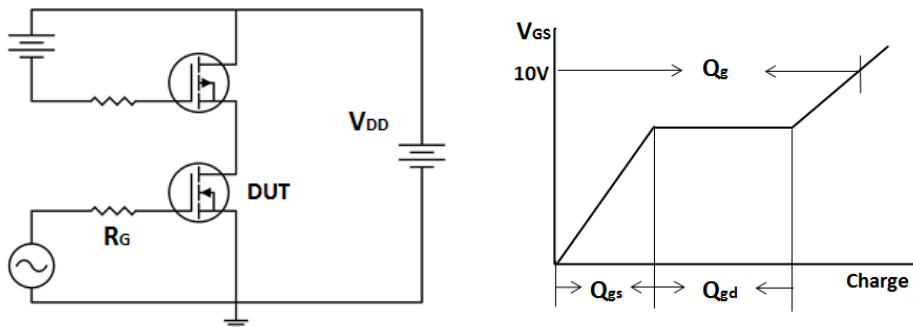


Fig. 9 Maximum drain current vs. ambient temperature

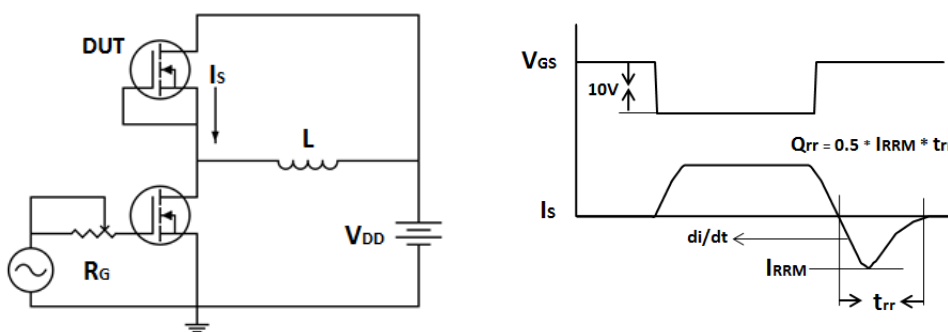
Test Circuits and Waveforms



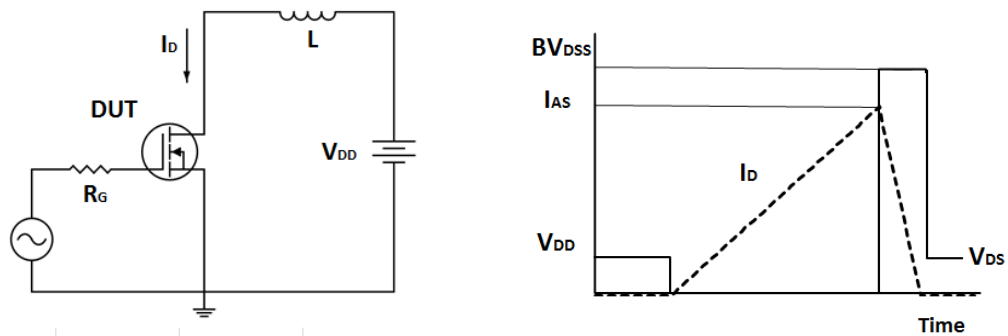
Resistive switching time test circuit & waveforms



Gate charge test circuit & waveform

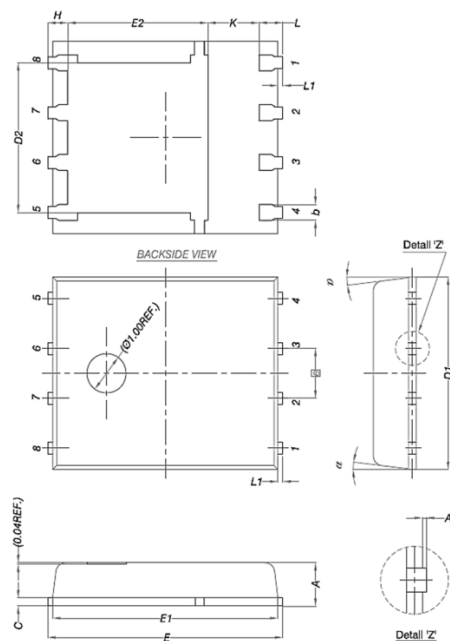


Peak diode recovery dv/dt test circuit & waveforms



Unclamped inductive switching test circuit & waveforms

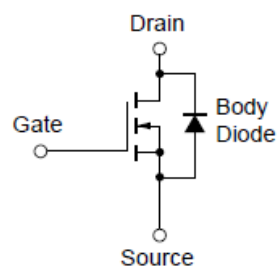
Package Drawing



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0	-	0.05
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
e	1.27 BSC		
H	0.41	0.51	0.61
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
α	0°	-	12°

DFN 5x6

Equivalent Circuit



Revision history of JMM5770N specification

Version	Change Items	Effective Date
1.00	Initial Release	14-Jul-20