

# JMM6715N

## *Product Preview*

### 60V N-Channel MOSFET

**Features**

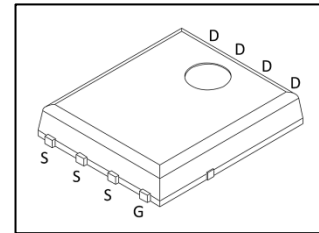
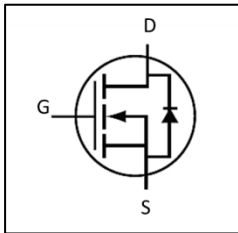
- Advanced shielded-gate technology
- Ultra-low on-resistance and gate-charge
- RoHS compliant



Product Summary	
V <sub>DS</sub>	60V
R <sub>DS(ON)</sub>	2.4 mΩ (Typ.)
	2.9 mΩ (Max.)

**Applications**

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


**Ordering Information**

Part Number	Marking	Package	Packaging
JMM6715N	MM6715N	DFN5x6	Tape & Reel

**Absolute Maximum Ratings**

Parameter	Symbol	Limit	Unit
Drain-to-Source Voltage	$V_{DS}$	60	V
Gate-to-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current, Silicon Limited ( $T_C = 25^\circ\text{C}$ ) <sup>(1)</sup>	$I_D$	125	A
Continuous Drain Current, Silicon Limited ( $T_C = 100^\circ\text{C}$ ) <sup>(1)</sup>	$I_D$	79	
Continuous Drain Current, Silicon Limited t ( $T_A = 25^\circ\text{C}$ ) <sup>(2), (3)</sup>	$I_D$	23	
Continuous Drain Current, Silicon Limited ( $T_A = 100^\circ\text{C}$ ) <sup>(2), (3)</sup>	$I_D$	14	
Pulsed Drain Current <sup>(4)</sup>	$I_{DM}$	240	
Power Dissipation ( $T_C = 25^\circ\text{C}$ )	$P_D$	86	W
Linear Derating Factor	-	0.69	W/ $^\circ\text{C}$
Single Pulse Avalanche Energy <sup>(5)</sup>	$E_{AS}$	130	mJ
Avalanche Current <sup>(6)</sup>	$I_{AS}$	40	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 <sup>(3)</sup>	$R_{\theta JA}$	45	$^\circ\text{C}/\text{W}$
Junction-to-Case Thermal Resistance	$R_{\theta JC}$	1.45	

**Static Electrical Characteristics <sup>(7)</sup>**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-to-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$	60	-	-	V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	1.2	-	2.2	
Drain-to-Source Leakage Current	$I_{DSS}$	$V_{DS} = 60\text{V}, V_{GS} = 0\text{V}$	-	-	1	$\mu\text{A}$
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{V}, V_{GS} = \pm 20\text{V}$	-	-	$\pm 100$	nA
Drain-to-Source On-Resistance	$R_{DS(ON)}$	$V_{GS} = 10\text{V}, I_D = 20\text{A}$	-	2.4	2.9	m $\Omega$
		$V_{GS} = 4.5\text{V}, I_D = 20\text{A}$	-	3.4	4.4	

**Dynamic Electrical Characteristics <sup>(7)</sup>**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Forward Transconductance	$g_{fs}$	$V_{DS} = 5V, I_D = 30A$	-	92	-	S
Total Gate Charge	$Q_g$	$V_{GS} = 10V,$ $V_{DS} = 30V,$ $I_D = 30A$	-	54	-	nC
Gate-to-Source Charge	$Q_{gs}$		-	8	-	
Gate-to-Drain Charge	$Q_{gd}$		-	12	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10V,$ $V_{DS} = 30V,$ $I_D = 15A,$ $R_G = 3.0\Omega$	-	23	-	ns
Rise Time	$t_r$		-	62	-	
Turn-Off Delay Time	$t_{d(off)}$		-	105	-	
Fall Time	$t_f$		-	28	-	
Input Capacitance	$C_{iss}$	$V_{GS} = 0V,$ $f = 1MHz,$ $V_{DS} = 25V$	-	3467	-	pF
Output Capacitance	$C_{oss}$		-	1400	-	
Reverse Transfer Capacitance	$C_{rss}$		-	50	-	

**Diode Characteristics <sup>(7)</sup>**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Forward Voltage	$V_{SD}$	$V_{GS} = 0V, I_S = 30A$	-	0.8	-	V
Reverse Recovery Time	$t_{rr}$	$V_{GS} = 0V, I_S = 30A,$ $di_S/dt = 100A/\mu s$	-	34	-	ns
Reverse Recovery Charge	$Q_{rr}$		-	50	-	nC

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

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

(3) Surface-mounted on 1 inch<sup>2</sup> FR4 board, 2 oz Cu

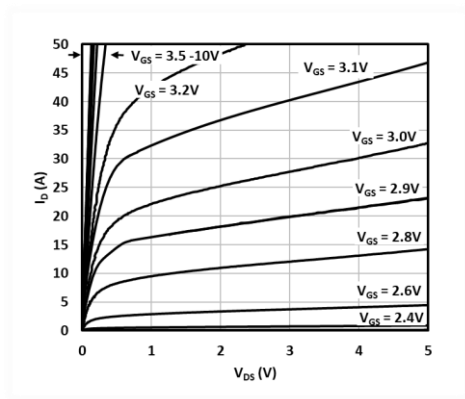
(4) Limited by maximum  $T_J$

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

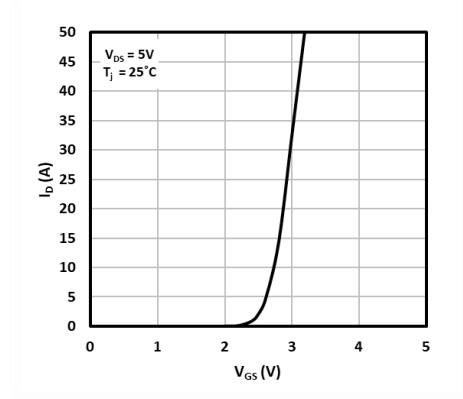
(6) Pulse width limited by maximum  $T_J$

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

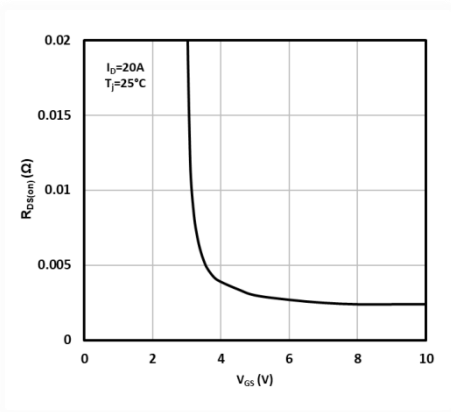
**Typical Electrical Characteristics**



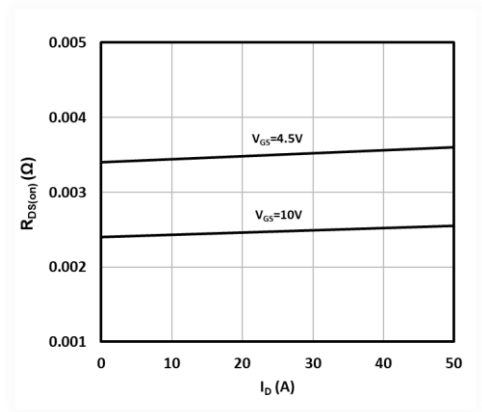
**Fig. 1 Output characteristics**



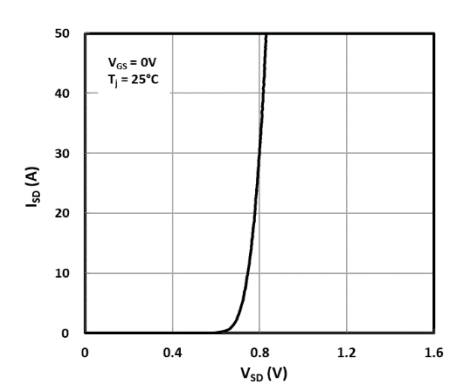
**Fig. 2 Transfer characteristics**



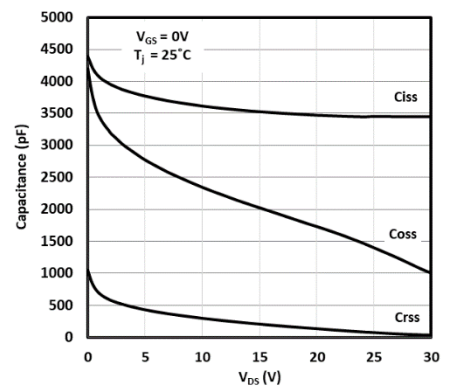
**Fig.3 On-resistance vs. gate voltage**



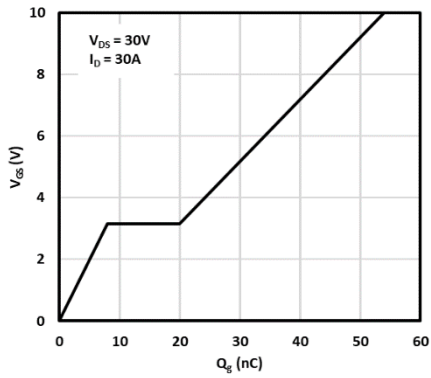
**Fig.4 On-resistance vs. drain current**



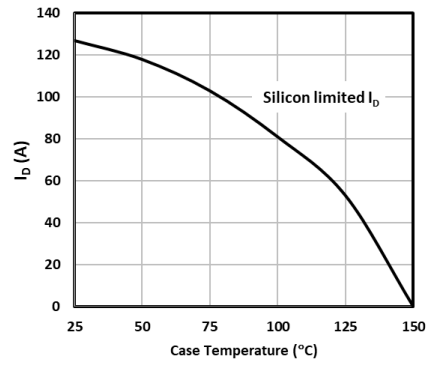
**Fig.5 Source-to-drain diode forward characteristics**



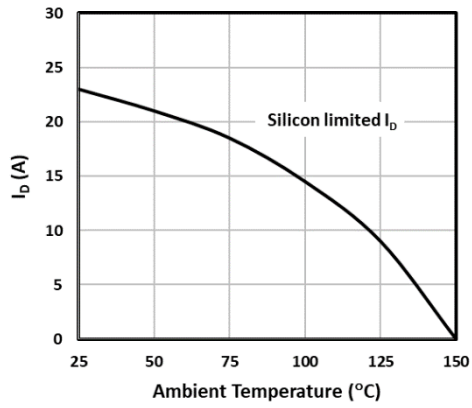
**Fig.6 Capacitance vs. drain-to-source voltage**



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

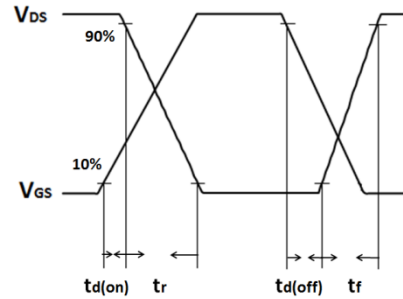
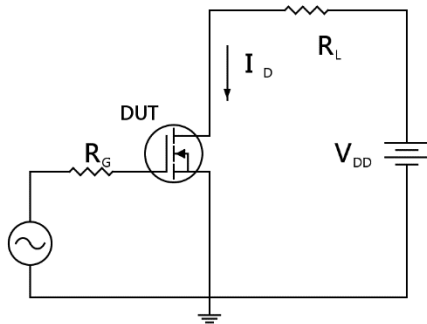


**Fig.8 Maximum drain current vs. case temperature**

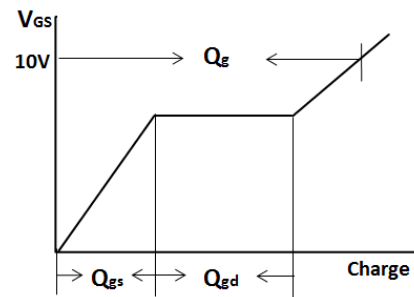
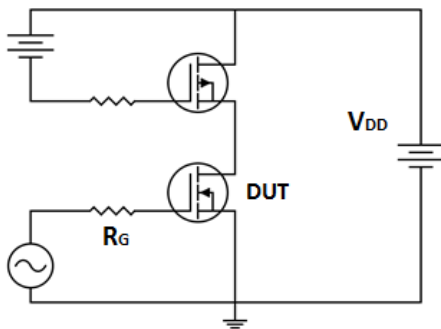


**Fig. 9 Maximum drain current vs. ambient temperature**

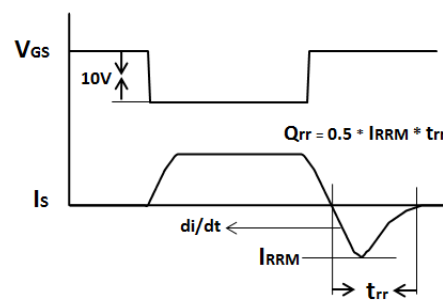
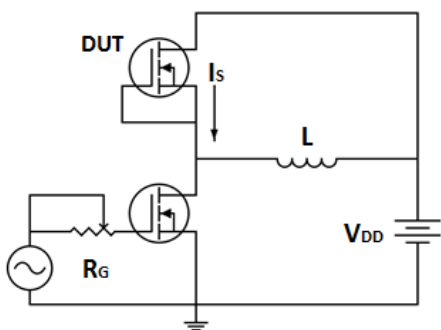
**Test Circuits and Waveforms**



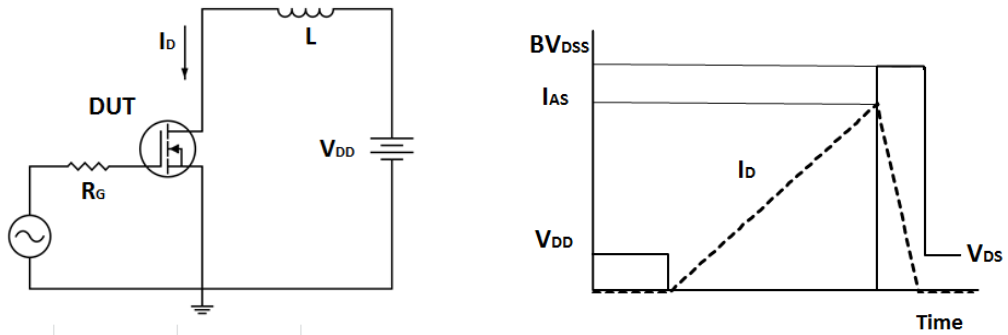
**Resistive switching time test circuit & waveforms**



**Gate charge test circuit & waveform**

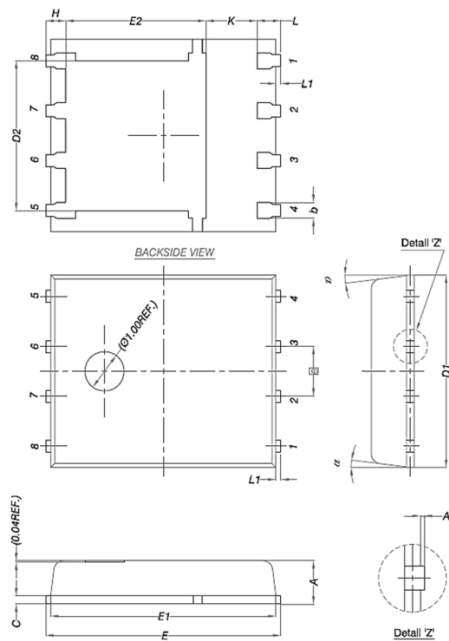


**Peak diode recovery  $dv/dt$  test circuit & waveforms**



**Unclamped inductive switching test circuit & waveforms**

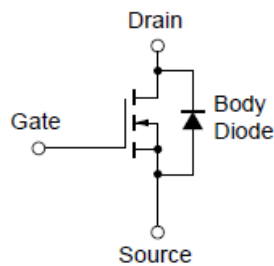
**Package Drawing**



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 JMM6715N specification**

<b>Version</b>	<b>Change Items</b>	<b>Effective Date</b>
1.00	Initial Release	26-Aug-20
1.01	Update drain current limits	14-Sep-20

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