

N-Channel MOSFET

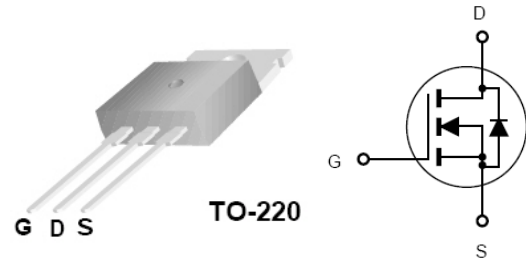
Applications:

- Power Supply
- DC-DC Converters

V_{DSS}	$R_{DS(ON)}(MAX)$	I_D^a
40V	4m Ω	137A

Features:

- Lead Free
- Low $R_{DS(ON)}$ to Minimize Conductive Loss
- Low Gate Charge for Fast Switching Application
- Optimized B_{VDSS} Capability



Ordering Information

Park Number	Package	Brand
MM137N04K	TO-220	MacMic

Absolute Maximum Ratings

$T_C=25^{\circ}C$ unless otherwise specified

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-to-Source Voltage	40	V
I_D^a	Continuous Drain Current	137	A
I_{DM}	Pulsed Drain Current @ $V_G=10V$	548	
P_D	Power Dissipation	150	W
	Derating Factor above $25^{\circ}C$	1.00	W/ $^{\circ}C$
V_{GS}	Gate-to-Source Voltage	+/-20	V
E_{AS}	Single Pulse Avalanche Energy ($L=11.9mH$, $I_{AS}=9A$)	773	mJ
I_{AS}	Pulsed Avalanche Energy	Figure 7	A
T_J and T_{STG}	Operating Junction and Storage Temperature Range	-55 to 175	$^{\circ}C$

Thermal Resistance

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
$R_{\theta JC}$	Junction-to-Case			1.00	$^{\circ}C/W$	Water cooled heatsink, P_D adjusted for a peak junction Temperature of $175^{\circ}C$
$R_{\theta JA}$	Junction-to-Ambient			62		1 cubic foot chamber, free air

Note:

a: Calculated continuous current based upon maximum allowable junction temperature $+175^{\circ}C$. Package limitation current is 80A.

OFF Characteristics $T_J=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
B_{VDSS}	Drain-to-Source Breakdown Voltage	40			V	$V_{GS}=0V$, $I_D=250\mu A$
I_{DSS}	Drain-to-Source Leakage Current			1	μA	$V_{DS}=32V$, $V_{GS}=0V$
				100		$V_{DS}=32V$, $V_{GS}=0V$, $T_J=125^{\circ}\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage			100	nA	$V_{GS}=+20V$
	Gate-to-Source Reverse Leakage			100		$V_{GS}=-20V$

ON Characteristics $T_J=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance			4	m Ω	$V_{GS}=10V$, $I_D=24A$
$V_{GS(TH)}$	Gate Threshold Voltage.	2		4	V	$V_{GS}=V_{DS}$, $I_D=250\mu A$

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
C_{iss}	Input Capacitance		4193		pF	$V_{GS}=0V$, $V_{DS}=25V$, $f=1.0\text{MHz}$
C_{oss}	Output Capacitance		648			
C_{rss}	Reverse Transfer Capacitance		236			
Q_g	Total Gate Charge		64		nC	$V_{DD}=20V$, $I_D=63A$, $V_{GS}=10V$
Q_{gs}	Gate-to-Source Charge		21			
Q_{gd}	Gate-to-Drain ("Miller") Charge		19			
$T_d(on)$	Turn-in Delay Time		17		nS	$V_{DD}=20V$, $I_D=63A$, $V_G=10V$, $R_G=4.7\Omega$
T_r	Rise Time		37			
$T_d(off)$	Turn-off Delay Time		85			
T_f	Fall Time		41			

Source-Drain Diode Characteristics $T_J=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Unit	Test Conditions
V_{SD}	Diode Forward Voltage			1.2	V	$I_S=24A$, $V_{GS}=0V$
t_{rr}	Reverse Recovery Time		59		ns	$I_F=38\text{Amps}$, $di/dt=100\text{Amps}/\mu S$
Q_{rr}	Reverse Recovery Charge		99		nC	

Figure 1. Maximum Power Dissipation V.S Case Temperature

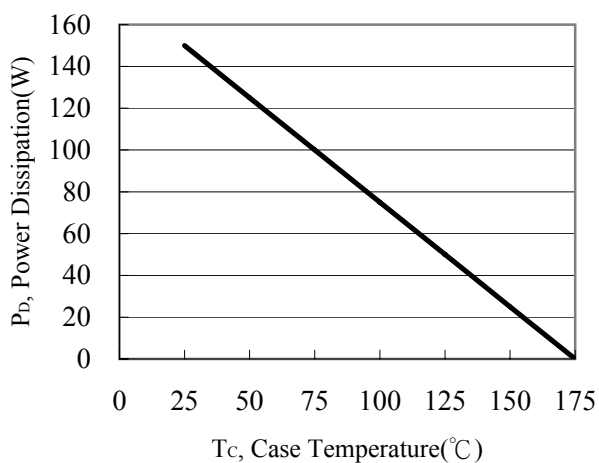


Figure 2. Maximum Continuous Drain Current V.S Case Temperature

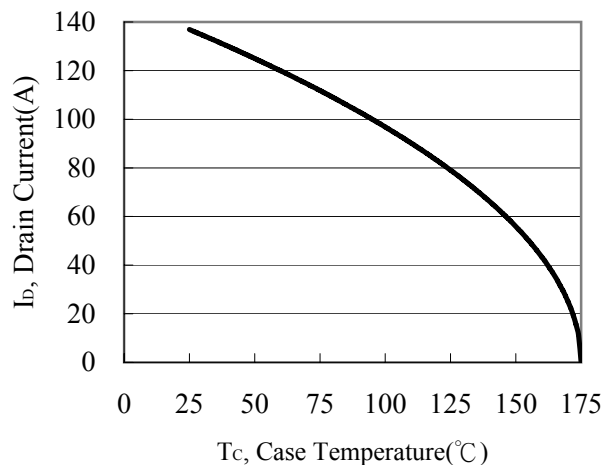


Figure 3. Typical Output Characteristics

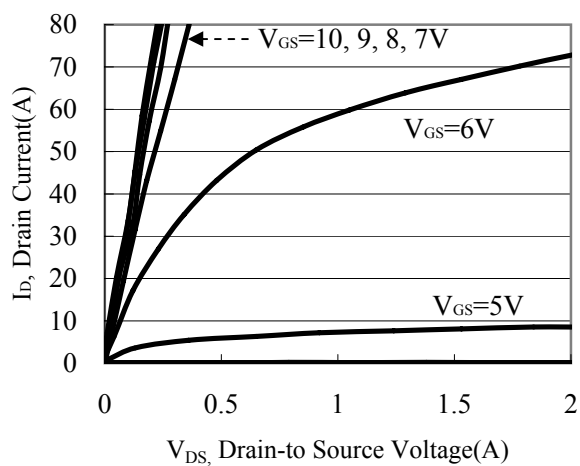


Figure 4. Breakdown Voltage V.S Junction Temperature

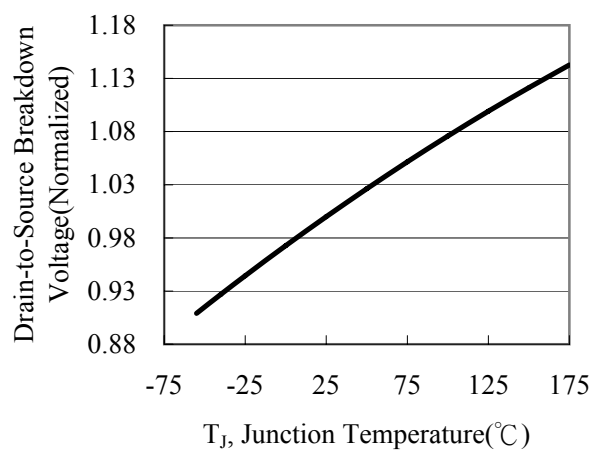


Figure 5. Threshold Voltage V.S Junction Temperature

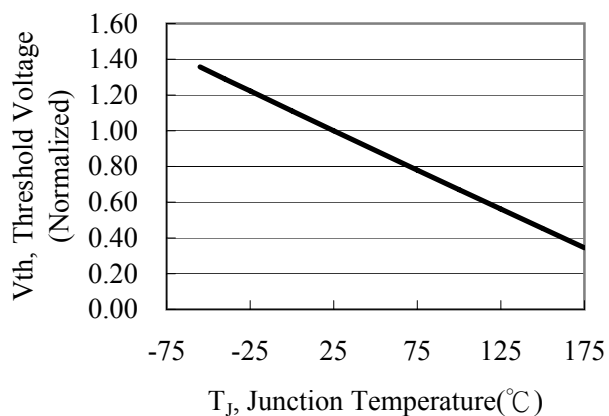


Figure 6. Drain-to-Source Resistance V.S Junction Temperature

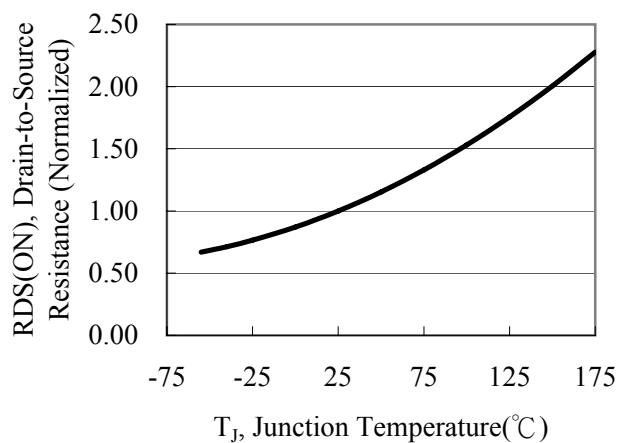


Figure 7. Typical Gate Charge vs. Gate-to-Source Voltage

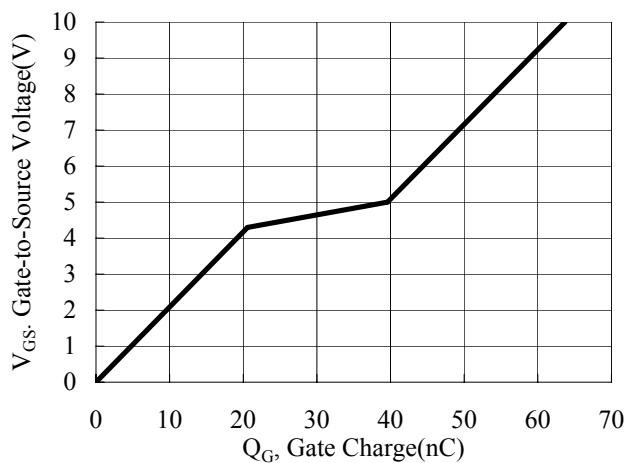


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

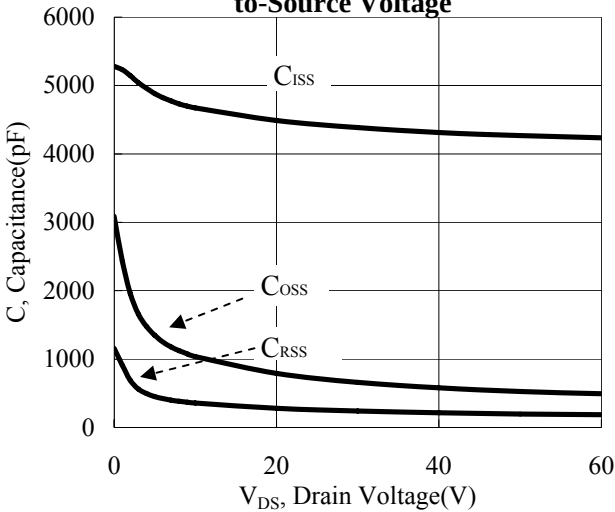


Figure 9. Unclamped Inductive Switching Capability

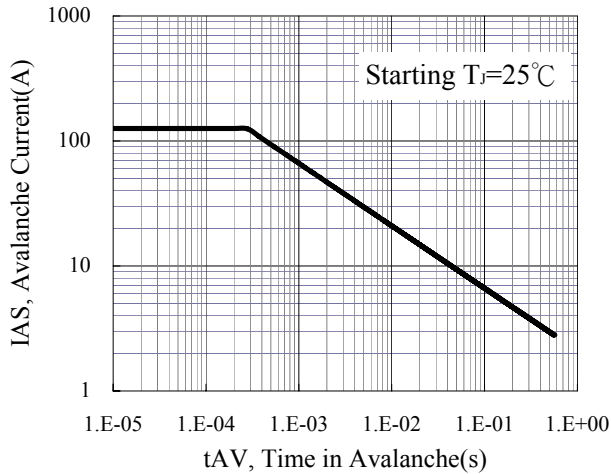


Figure 10. Source-Drain Diode Forward Voltage

