

# N-Channel Enhancement Mode MOSFET

## 1. Product Information

### 1.1 Features

- Surface-mounted package
- Extremely low threshold voltage
- Advanced trench cell design

### 1.2 Applications

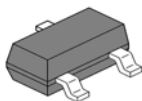
- Portable appliances
- Battery management
- High speed switch
- Low power DC to DC Converter

### 1.3 Quick reference

- $BV \geq 30\text{ V}$
- $R_{DS(ON)} \leq 53\text{ m}\Omega @ V_{GS} = 10\text{ V}$
- $P_{tot} \leq 0.83\text{ W}$
- $R_{DS(ON)} \leq 84\text{ m}\Omega @ V_{GS} = 4.5\text{ V}$
- $I_D \leq 3.2\text{ A}$

## 2. Pin Description

Pin	Description	Simplified Outline	Symbol
1	Gate(G)	 Top View SOT23	
2	Source(S)		
3	Drain(D)		



### 3. Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DS}$	Drain-Source Voltage	$T_A = 25\text{ }^\circ\text{C}$		30	V
$V_{GS}$	Gate-Source Voltage	$T_A = 25\text{ }^\circ\text{C}$		$\pm 20$	V
$I_D^*$	Drain Current	$T_A = 25\text{ }^\circ\text{C}, V_{GS} = 10\text{ V}$		3.2	A
		$T_A = 100\text{ }^\circ\text{C}, V_{GS} = 10\text{ V}$		2	A
$I_{DM}^{***}$	Pulsed Drain Current	$T_A = 25\text{ }^\circ\text{C}, V_{GS} = 10\text{ V}$		10	A
$P_{tot}$	Total Power Dissipation	$T_A = 25\text{ }^\circ\text{C}$		0.83	W
$T_{stg}$	Storage Temperature		-55	150	$^\circ\text{C}$
$T_J$	Junction Temperature		-55	150	$^\circ\text{C}$
$I_S$	Diode Forward Current	$T_A = 25\text{ }^\circ\text{C}$		1.2	A
$R_{\theta JA}$	Thermal Resistance- Junction to Ambient			150	$^\circ\text{C/W}$

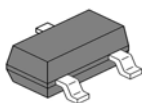
Notes :

\* Surface Mounted on 1 in<sup>2</sup> pad area,  $t \leq 10\text{ sec}$

\*\* Pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$

### 4. Marking Information

Product Name	Marking
iM2111	<b>111X</b> X: Date Code



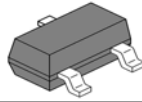
## 5. Electrical Characteristics (T<sub>A</sub>=25 °C Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>DS</sub> = 250 μA	30			V
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>DS</sub> = 250 μA	1.2	1.8	2.4	V
I <sub>DSS</sub>	Drain Leakage Current	V <sub>DS</sub> = 24 V, V <sub>GS</sub> = 0V T <sub>J</sub> = 85 °C			1	μA
					30	μA
I <sub>GSS</sub>	Gate Leakage Current	V <sub>GS</sub> = ±16 V, V <sub>DS</sub> = 0 V			±10	μA
R <sub>DS(ON)</sub> <sup>a</sup>	On-State Resistance	V <sub>GS</sub> = 10 V, I <sub>DS</sub> = 3.2 A		44	53	mΩ
		V <sub>GS</sub> = 4.5 V, I <sub>DS</sub> = 2 A		60	84	
<b>Diode Characteristics</b>						
V <sub>SD</sub> <sup>a</sup>	Diode Forward Voltage	I <sub>SD</sub> = 1.2 A, V <sub>GS</sub> = 0V		0.8	1.3	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>SD</sub> = 2.8 A, dI <sub>SD</sub> /dt = 100 A/μs		21		ns
Q <sub>rr</sub>	Reverse Recovery Charge			7		nC
<b>Dynamic Characteristics<sup>b</sup></b>						
R <sub>G</sub>	Gate Resistance	V <sub>GS</sub> = V <sub>DS</sub> = 0 V, F = 1 MHz		5		Ω
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V Frequency = 1 MHz		270		pF
C <sub>oss</sub>	Output Capacitance			55		
C <sub>rss</sub>	Reverse Transfer Capacitance			30		
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DS</sub> = 15 V, V <sub>GEN</sub> = 10 V, R <sub>G</sub> = 6 Ω, R <sub>L</sub> = 15 Ω, I <sub>DS</sub> = 1 A		6	12	ns
t <sub>r</sub>	Turn-on Rise Time			10	19	
t <sub>d(off)</sub>	Turn-off Delay Time			15	30	
t <sub>f</sub>	Turn-off Fall Time			3	6	
<b>Gate Charge Characteristics<sup>b</sup></b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> = 10 V, V <sub>DS</sub> = 15 V, I <sub>DS</sub> = 2.8 A		6	8	nC
Q <sub>gs</sub>	Gate-Source Charge			0.8		
Q <sub>gd</sub>	Gate-Drain Charge			0.5		

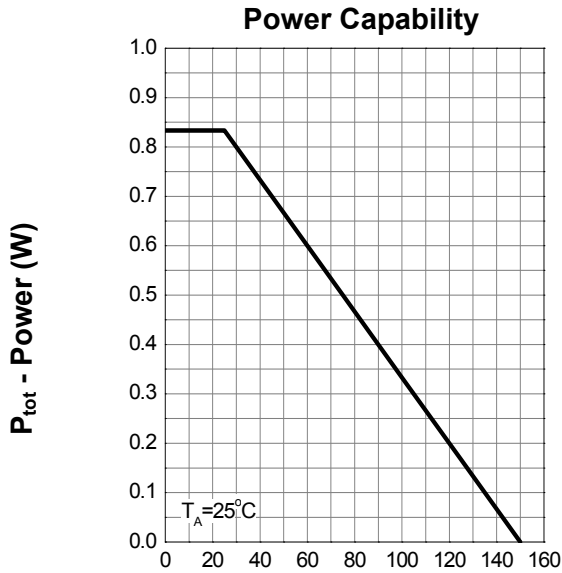
Notes :

a : Pulse test ; pulse width ≤ 300 μs, duty cycle ≤ 2%

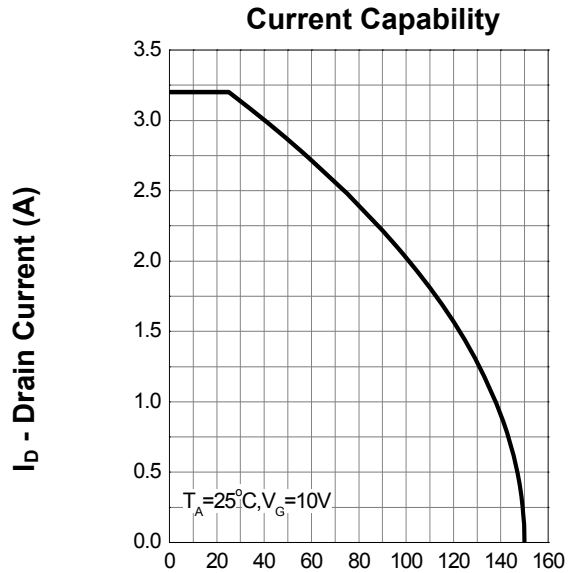
b : Guaranteed by design, not subject to production testing



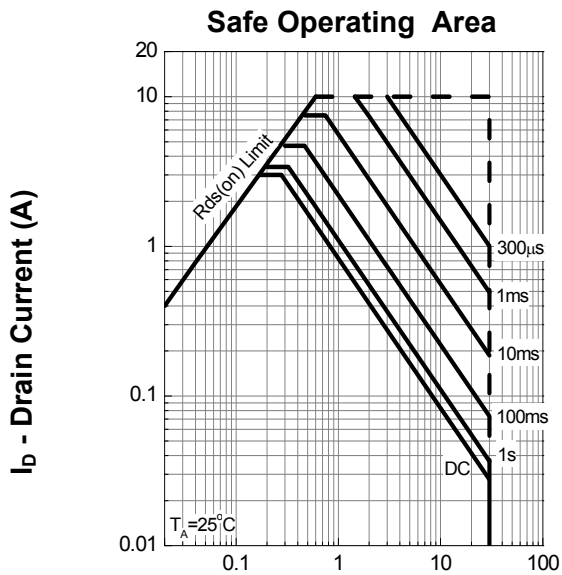
Typical Characteristics



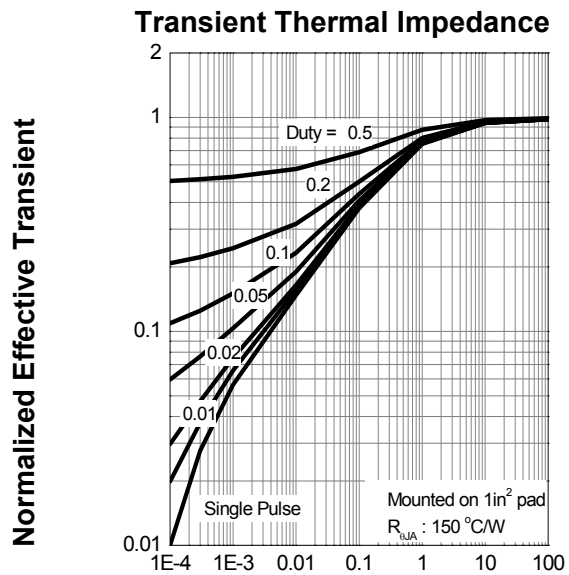
$T_{mp}$  - Mounting Point Temp. ( $^{\circ}C$ )



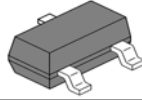
$T_{mp}$  - Mounting Point Temp. ( $^{\circ}C$ )



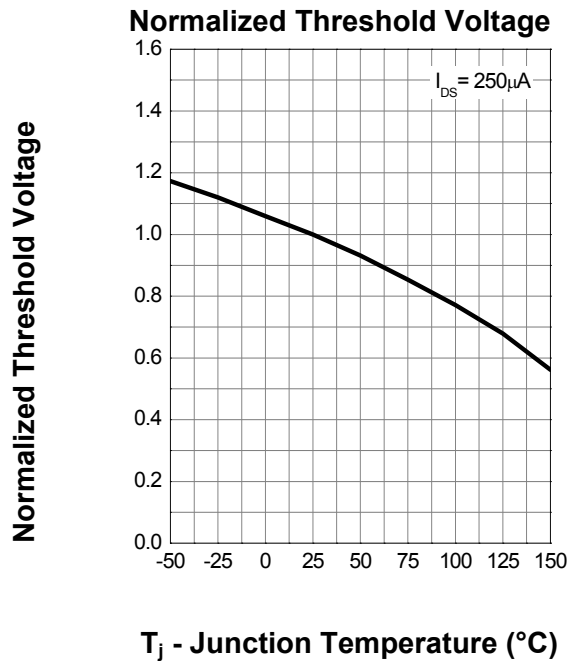
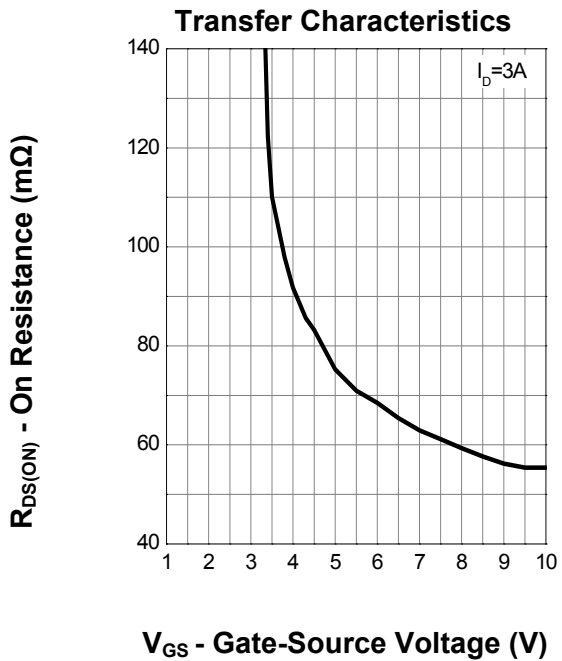
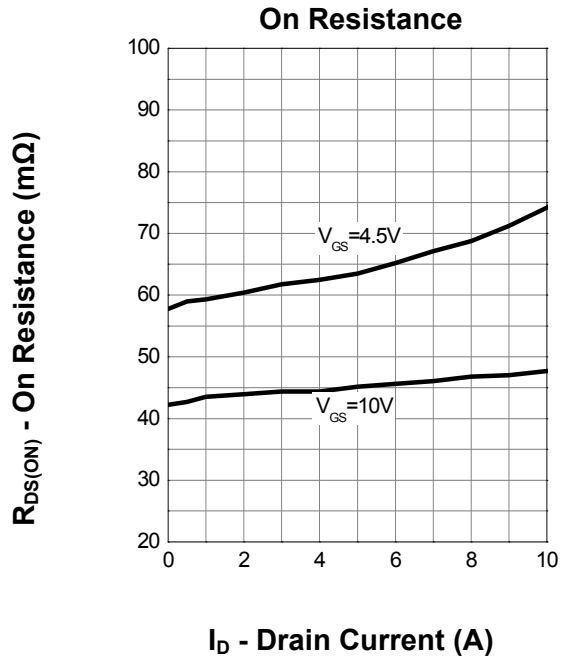
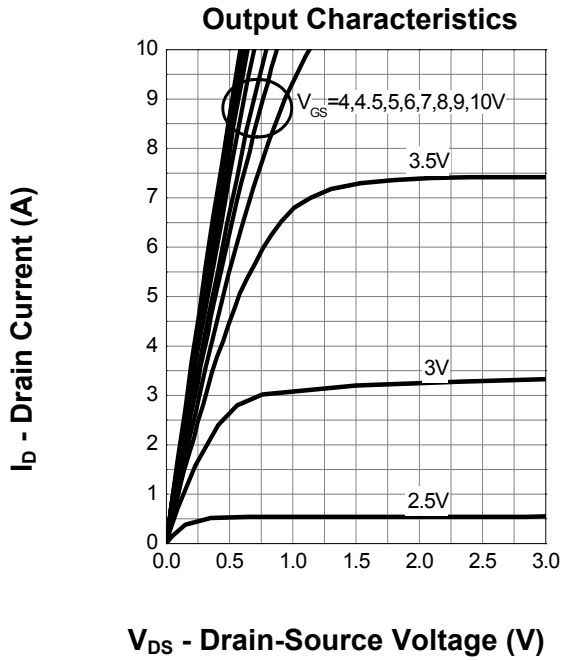
$V_{DS}$  - Drain-Source Voltage (V)

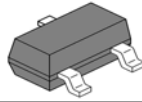


Square Wave Pulse Duration (sec)



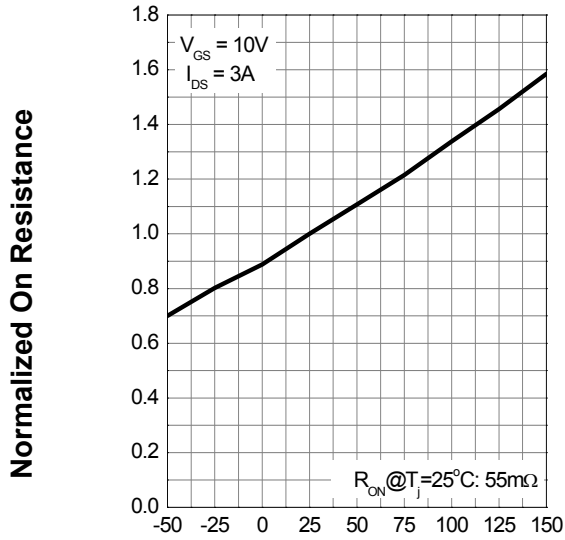
Typical Characteristics





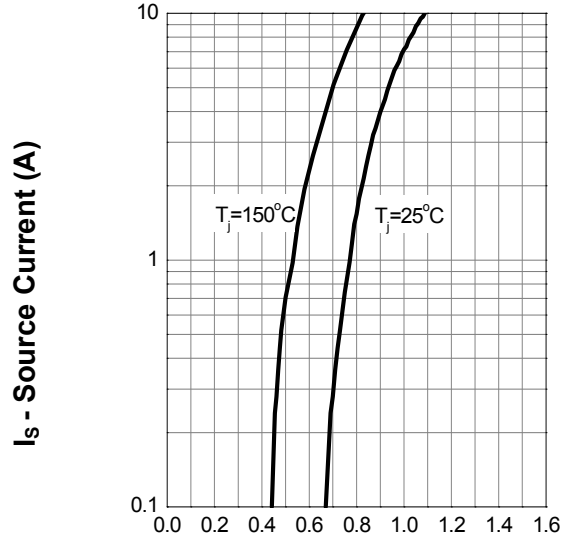
### Typical Characteristics

Normalized-Source On Resistance



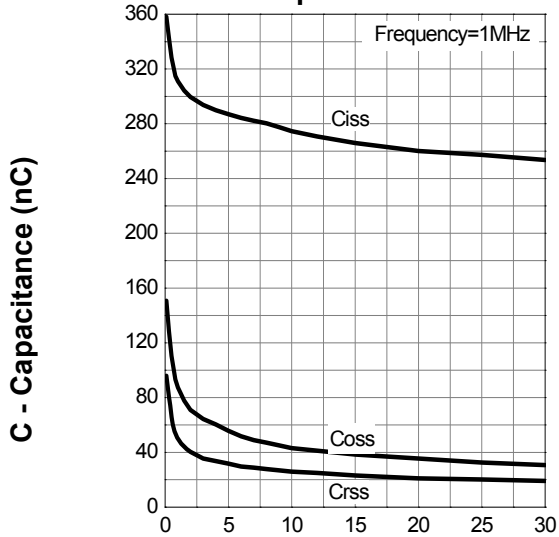
T<sub>j</sub> - Junction Temperature (°C)

Diode Forward Current



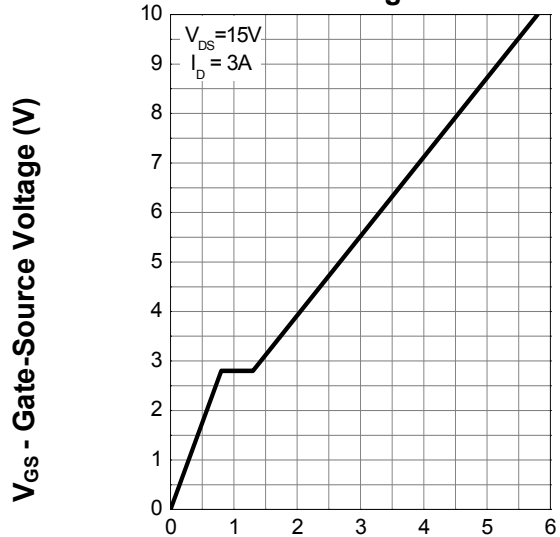
V<sub>SD</sub> - Source-Drain Voltage (V)

Capacitance



V<sub>DS</sub> - Drain-Source Voltage (V)

Gate Charge



Q<sub>G</sub> - Gate Charge (nC)