



# Dual 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

### 1.3 Quick reference

- $BV \geq 20\text{ V}$
- $R_{DS(ON)} \leq 24.5\text{ m}\Omega @ V_{GS} = 4.5\text{ V}$
- $P_{tot} \leq 1.25\text{ W}$
- $R_{DS(ON)} \leq 38\text{ m}\Omega @ V_{GS} = 2.5\text{ V}$
- $I_D \leq 5.4\text{ A}$

## 2. Pin Description

Pin	Description	Simplified Outline	Symbol
1	Drain(D1)	 Top View TSSOP-8L	
2,3	Source(S1)		
4	Gate(G1)		
5	Gate(G2)		
6,7	Source(S2)		
8	Drain(D2)		



## 3. Limiting Values

Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DS}$	Drain-Source Voltage	$T_A = 25\text{ }^\circ\text{C}$	-	20	V
$V_{GS}$	Gate-Source Voltage	$T_A = 25\text{ }^\circ\text{C}$	-	$\pm 10$	V
$I_D^*$	Drain Current	$T_A = 25\text{ }^\circ\text{C}, V_{GS} = 4.5\text{ V}$	-	5.4	A
		$T_A = 100\text{ }^\circ\text{C}, V_{GS} = 4.5\text{ V}$	-	3.4	A
$I_{DM}^{***}$	Pulsed Drain Current	$T_A = 25\text{ }^\circ\text{C}, V_{GS} = 4.5\text{ V}$	-	20	A
$P_{tot}$	Total Power Dissipation	$T_A = 25\text{ }^\circ\text{C}$	-	1.25	W
$T_{stg}$	Storage Temperature		- 55	150	$^\circ\text{C}$
$T_J$	Junction Temperature		- 55	150	$^\circ\text{C}$
$I_S$	Diode Forward Current	$T_A = 25\text{ }^\circ\text{C}$	-	1.5	A
$R_{\theta JA}$	Thermal Resistance- Junction to Ambient		-	100	$^\circ\text{C/W}$

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
iM9511	<div style="border: 1px solid black; padding: 2px; display: inline-block;">                     iM9511                      XXXXX                 </div> X : Date Code

## 5. Ordering Code

iM9511 <input type="checkbox"/> └── Assembly Material	Assembly Material G: Halogen and Lead Free Device
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Note: inergy defines "Green" as lead-free (RoHS compliant) and halogen free (Br or Cl does not exceed 900 ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500 ppm by weight; Follow IEC 61249-2-21 and IPC / JEDEC J-STD-020C)



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

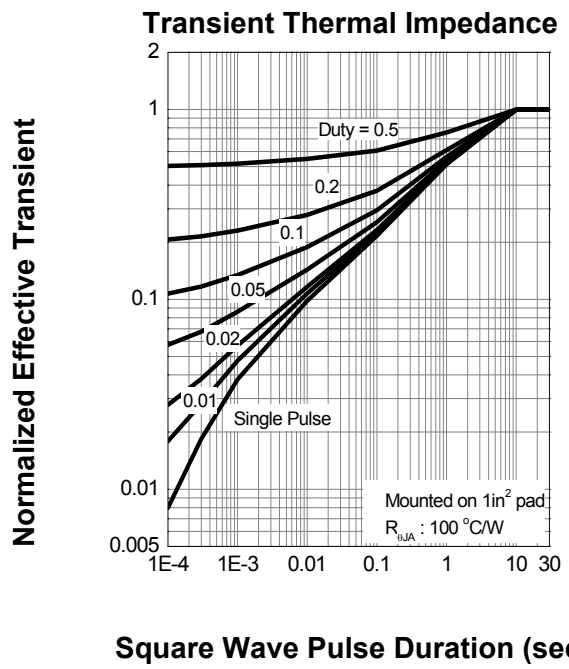
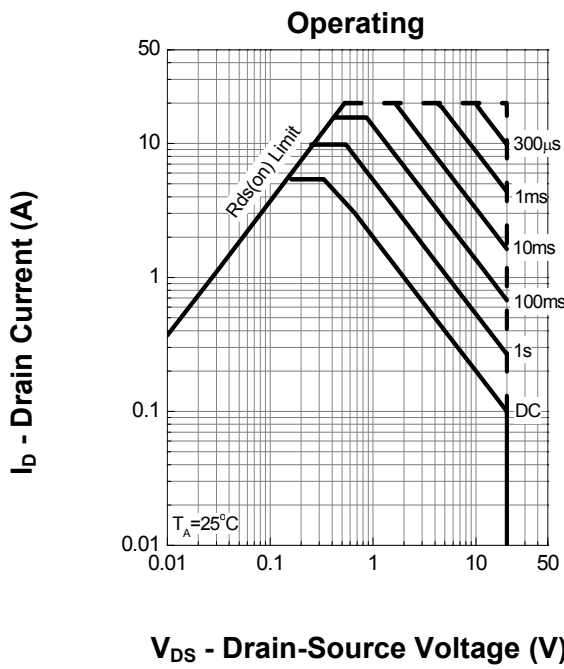
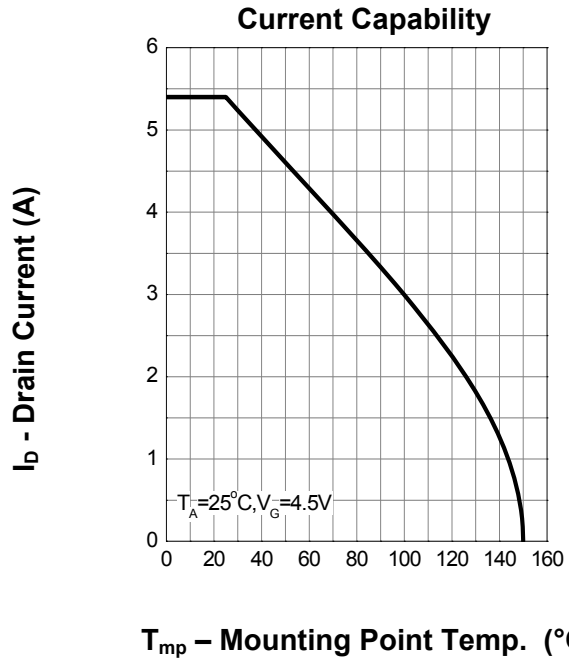
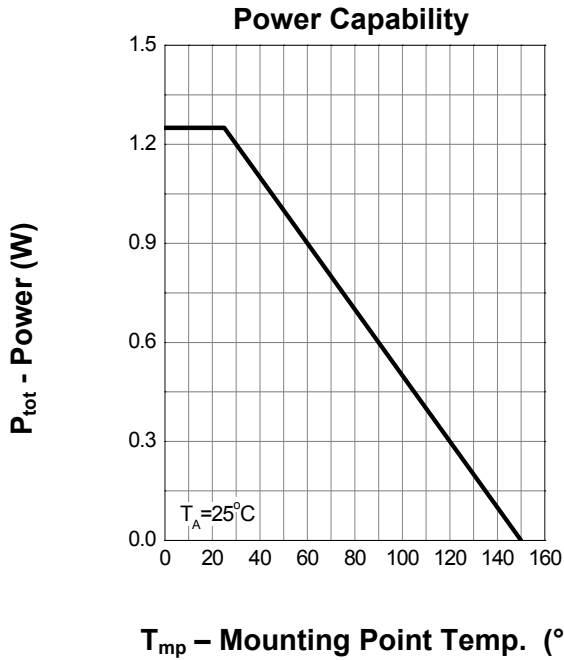
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>DS</sub> = 250 μA	20	-	-	V
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>DS</sub> = 250 μA	0.5	0.7	1	V
I <sub>DSS</sub>	Drain Leakage Current	V <sub>DS</sub> = 16 V, V <sub>GS</sub> = 0 V	-	-	1	μA
		T <sub>J</sub> = 85 °C	-	-	30	μA
I <sub>GSS</sub>	Gate Leakage Current	V <sub>GS</sub> = ± 10 V, V <sub>DS</sub> = 0 V	-	-	± 100	nA
R <sub>DS(ON)</sub> <sup>a</sup>	On-State Resistance	V <sub>GS</sub> = 4.5 V, I <sub>DS</sub> = 5.4 A	-	23	24.5	mΩ
		V <sub>GS</sub> = 2.5 V, I <sub>DS</sub> = 4.5 A	-	28	38	
<b>Diode Characteristics</b>						
V <sub>SD</sub> <sup>a</sup>	Diode Forward Voltage	I <sub>SD</sub> = 1.5 A, V <sub>GS</sub> = 0 V	-	0.7	1.1	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>SD</sub> = 5.4 A, dI <sub>SD</sub> /dt = 100 A/μs	-	13	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge		-	3.5	-	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	-	2	-	Ω
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 10 V Frequency = 1 MHz	-	700	-	pF
C <sub>oss</sub>	Output Capacitance		-	125	-	
C <sub>rss</sub>	Reverse Transfer Capacitance		-	110	-	
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DS</sub> = 10 V, V <sub>GEN</sub> = 4.5 V, R <sub>G</sub> = 6 Ω, R <sub>L</sub> = 10 Ω, I <sub>DS</sub> = 1 A	-	4.6	15	ns
t <sub>r</sub>	Turn-on Rise Time		-	14	27	
t <sub>d(off)</sub>	Turn-off Delay Time		-	30	60	
t <sub>f</sub>	Turn-off Fall Time		-	5	15	
<b>Gate Charge Characteristics<sup>b</sup></b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> = 4.5 V, V <sub>DS</sub> = 10 V, I <sub>DS</sub> = 5.4 A	-	12.5	18.8	nC
Q <sub>gs</sub>	Gate-Source Charge		-	0.72	-	
Q <sub>gd</sub>	Gate-Drain Charge		-	4.3	-	

Notes :

- a : Pulse test ; pulse width ≤ 300 μs, duty cycle ≤ 2 %
- b : Guaranteed by design, not subject to production testing

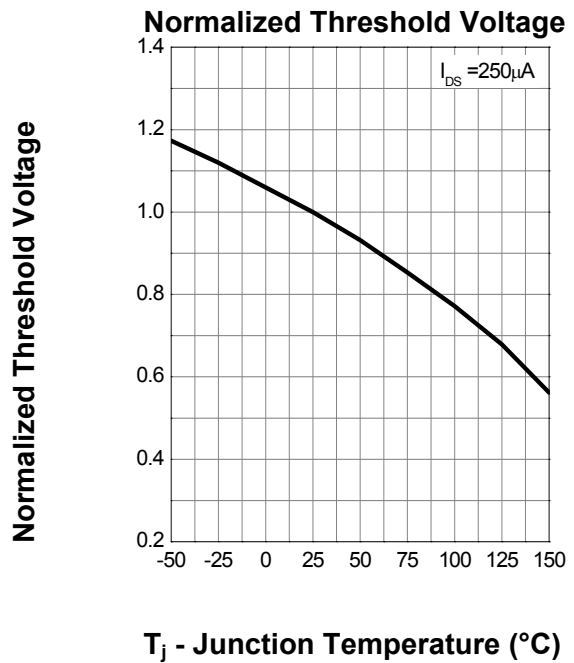
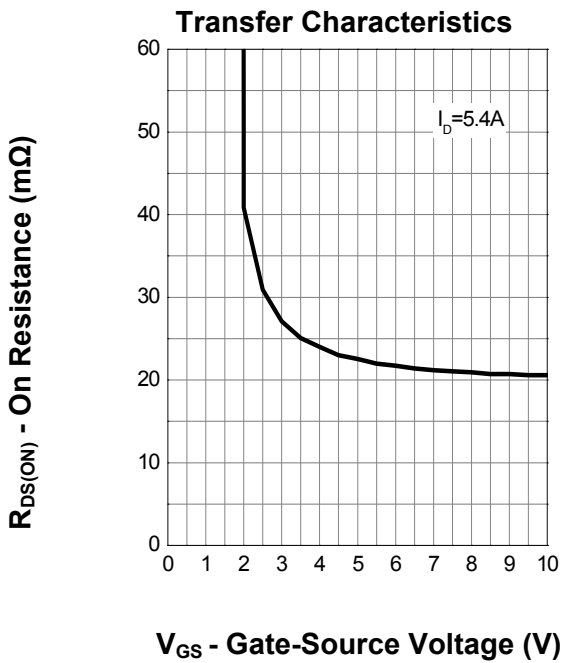
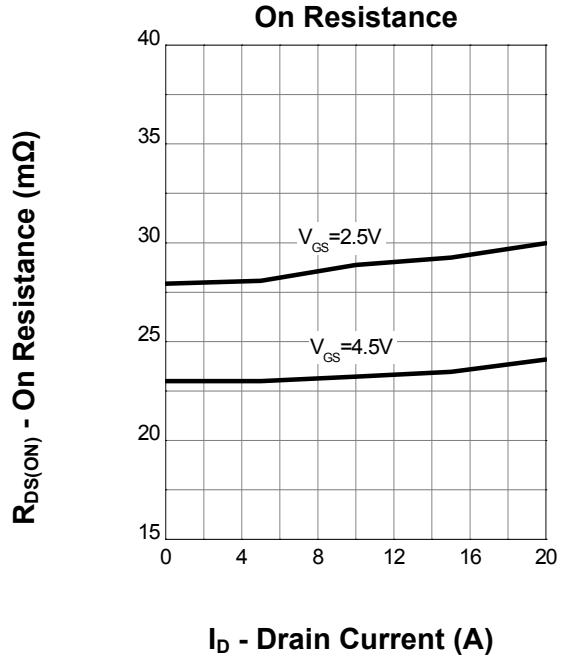
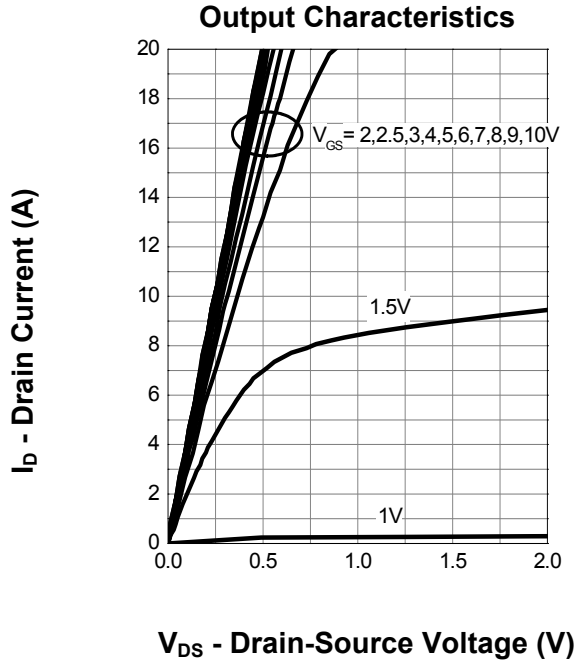


## 7. Typical Characteristics



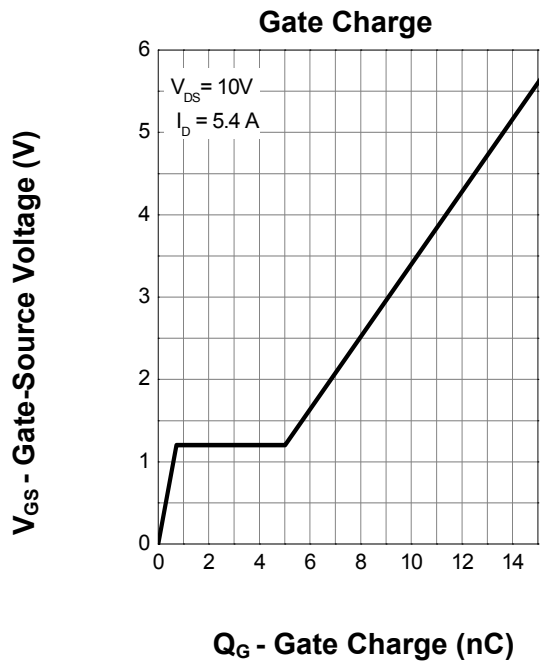
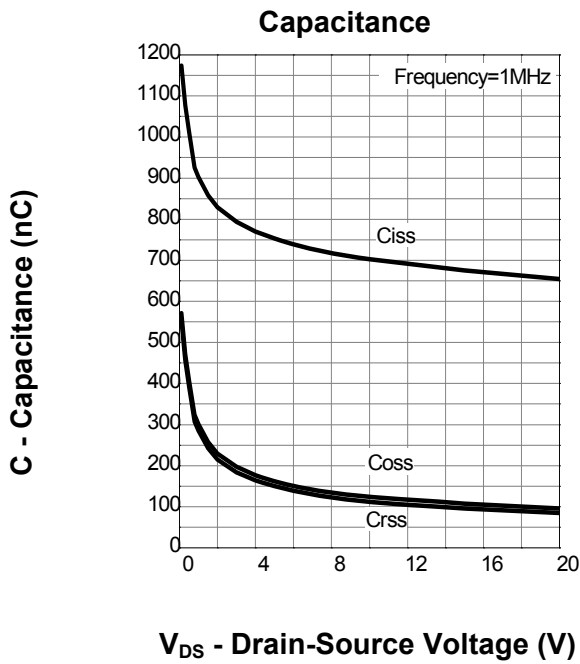
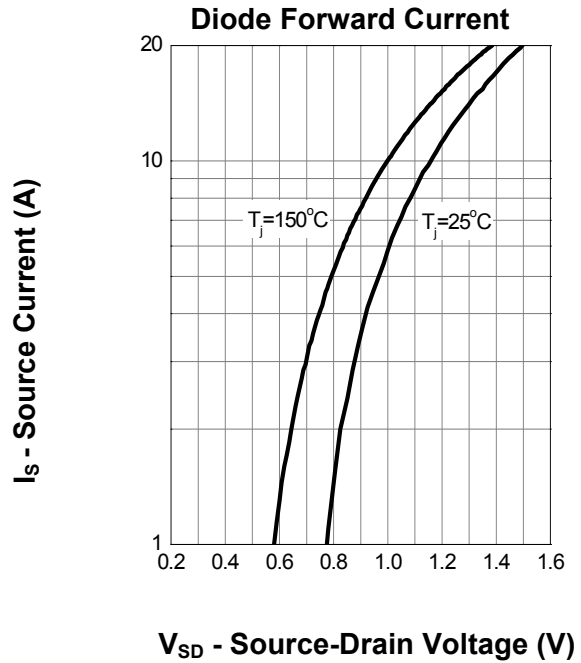
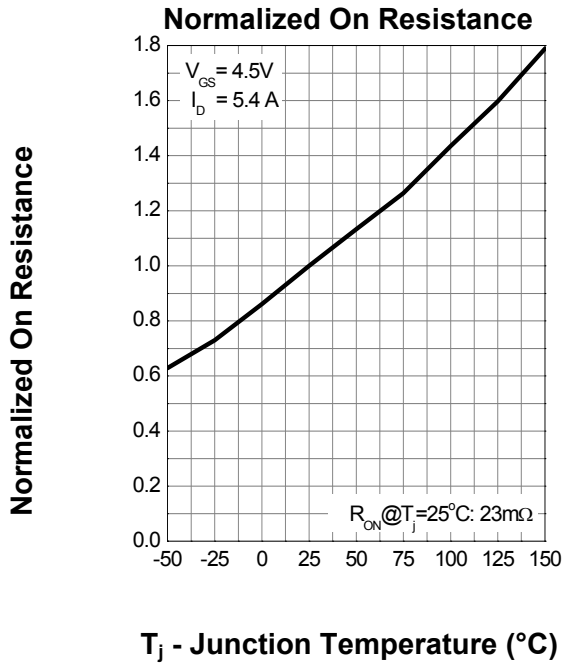


## 7. Typical Characteristics (cont.)





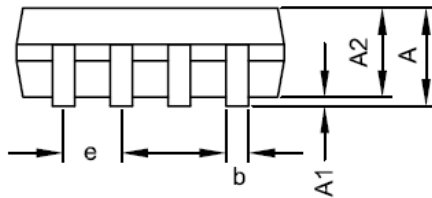
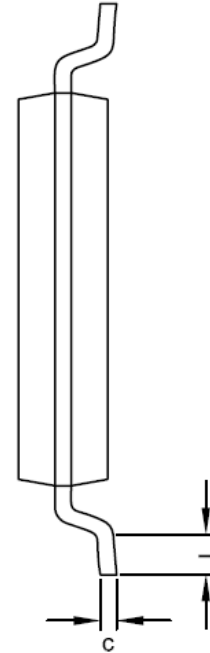
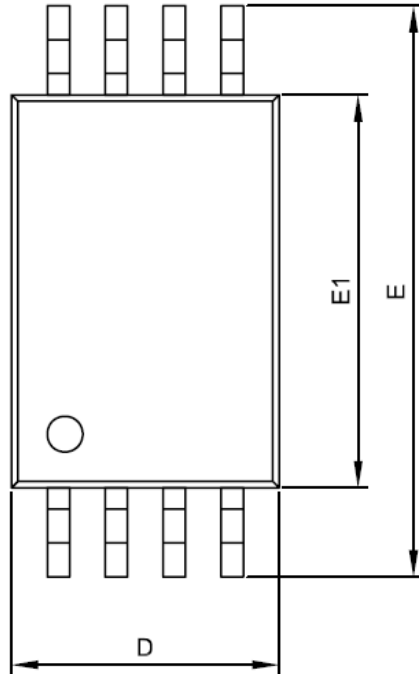
## 7. Typical Characteristics (cont.)





## 8. Package Dimensions

TSSOP- 8L



Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	—	1.20
A1	0.00	0.15
A2	0.85	1.05
D	2.90	3.10
E	6.20	6.60
E1	4.30	4.50
c	0.09	0.20
b	0.19	0.30
e	0.65 BSC	
L	0.45	0.75