



Dual N-Channel Enhancement Mode MOSFET

1. Product Information

1.1 Features

- Surface-mounted package
- Advanced trench cell design
- Extremely low threshold voltage
- ESD protected (HBM>2KV)

1.2 Applications

- Portable appliances
- Battery management

1.3 Quick reference

- $BV \geq 20\text{ V}$
- $P_{tot} \leq 1.25\text{ W}$
- $I_D \leq 6.4\text{ A}$
- $R_{DS(ON)} \leq 20\text{ m}\Omega @ V_{GS} = 4.5\text{ V}$
- $R_{DS(ON)} \leq 28\text{ m}\Omega @ V_{GS} = 2.5\text{ V}$

2. Pin Description

Pin	Description	Simplified Outline	Symbol
1	Drain(D)	<p style="text-align: center;">Top View TSSOP8</p>	
2,3	Source(S1)		
4	Gate(G1)		
5	Gate(G2)		
6,7	Source(S2)		
8	Drain(D)		



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	$T_A = 25\text{ }^\circ\text{C}$	-	± 12	V
I_D^*	Drain Current	$T_A = 25\text{ }^\circ\text{C}, V_{GS} = 4.5\text{ V}$	-	6.4	A
		$T_A = 100\text{ }^\circ\text{C}, V_{GS} = 4.5\text{ V}$	-	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	$^\circ\text{C} / \text{W}$

Notes :

- * Surface Mounted on 1 in² 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
iM9513	<div style="display: inline-block; border: 1px solid black; padding: 2px;">iM9513 XXXXX</div> X : Date Code

5. Ordering Code

iM9513 <input type="checkbox"/> <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_A = 25 °C Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _{DS} = 250 μA	20	-	-	V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _{DS} = 250 μA	0.5	0.7	1	V
I _{DSS}	Drain Leakage Current	V _{DS} = 16 V, V _{GS} = 0V	-	-	1	μA
		T _J = 85 °C	-	-	30	μA
I _{GSS}	Gate Leakage Current	V _{GS} = ± 10 V, V _{DS} = 0 V	-	-	± 10	μA
R _{DS(ON)} ^a	On-State Resistance	V _{GS} = 4.5 V, I _{DS} = 6.4 A	-	16	20	mΩ
		V _{GS} = 2.5 V, I _{DS} = 5 A	-	20	28	
Diode Characteristics						
V _{SD} ^a	Diode Forward Voltage	I _{SD} = 1.5 A, V _{GS} = 0 V	-	0.7	1.1	V
t _{rr}	Reverse Recovery Time	I _{SD} = 6.4 A, dI _{SD} /dt = 100 A/μs	-	27	-	ns
Q _{rr}	Reverse Recovery Charge		-	15	-	nC
Dynamic Characteristics^b						
R _G	Gate Resistance	V _{GS} = V _{DS} = 0 V, F = 1 MHz	-	4	-	Ω
C _{iss}	Input Capacitance	V _{GS} = 0 V, V _{DS} = 10 V Frequency = 1 MHz	-	690	-	pF
C _{oss}	Output Capacitance		-	145	-	
C _{rss}	Reverse Transfer Capacitance		-	140	-	
t _{d(on)}	Turn-on Delay Time	V _{DS} = 10 V, V _{GEN} = 4.5 V, R _G = 6 Ω, R _L = 10 Ω, I _{DS} = 1 A	-	7	12	ns
t _r	Turn-on Rise Time		-	11	24	
t _{d(off)}	Turn-off Delay Time		-	63	120	
t _f	Turn-off Fall Time		-	38	65	
Gate Charge Characteristics^b						
Q _g	Total Gate Charge	V _{GS} = 4.5 V, V _{DS} = 10 V, I _{DS} = 6.4 A	-	14.5	20	nC
Q _{gs}	Gate-Source Charge		-	0.88	-	
Q _{gd}	Gate-Drain Charge		-	5.6	-	

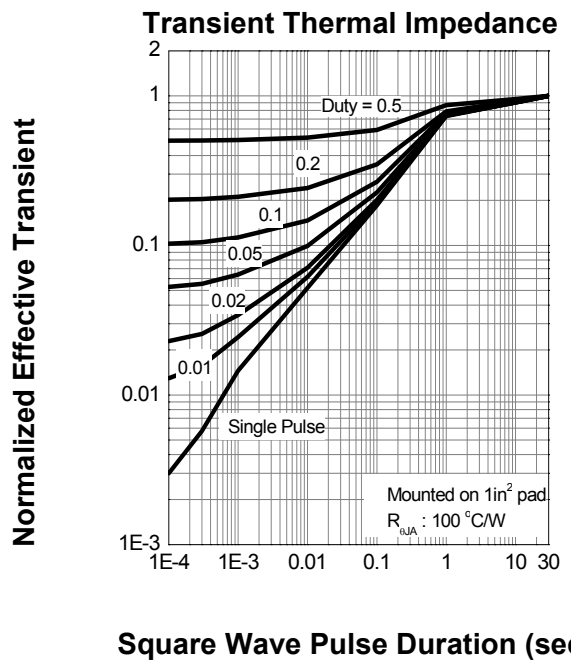
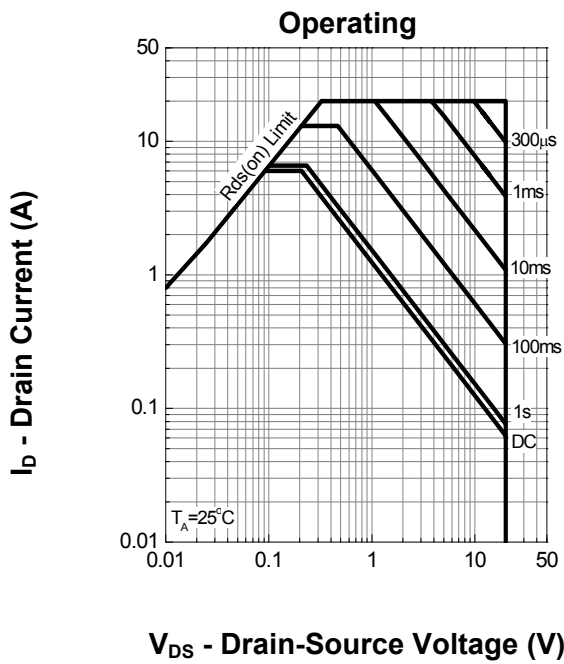
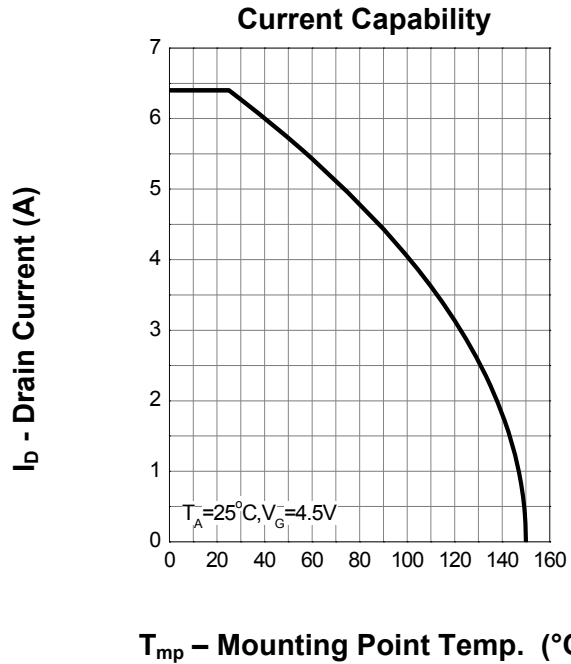
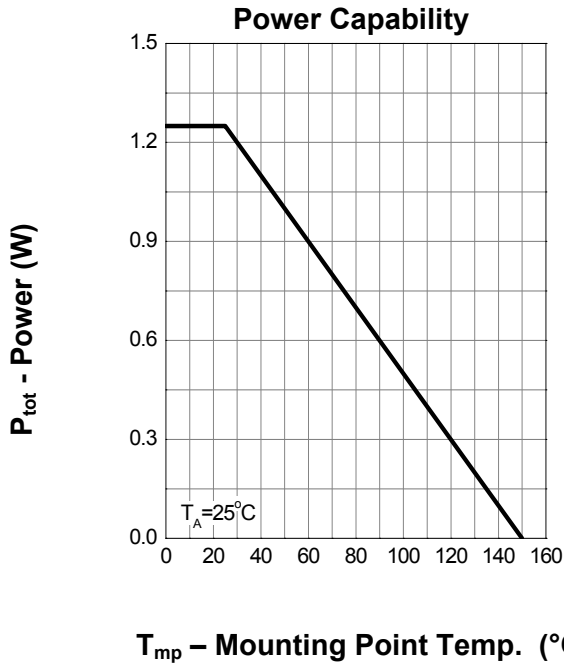
Notes :

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

b : Guaranteed by design, not subject to production testing

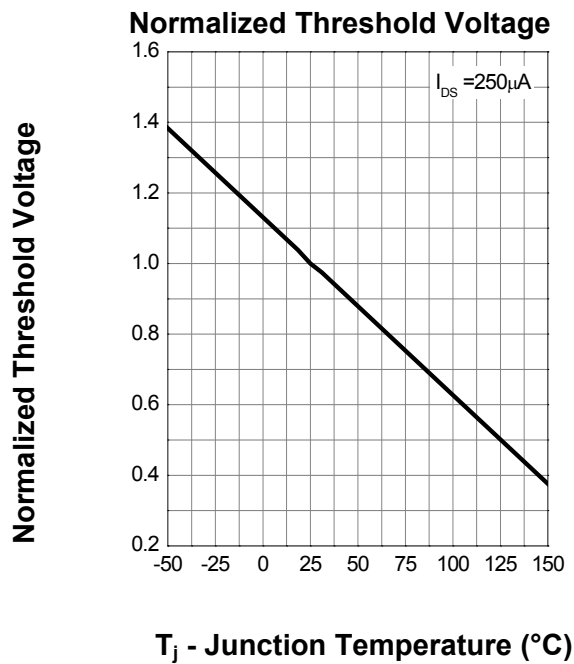
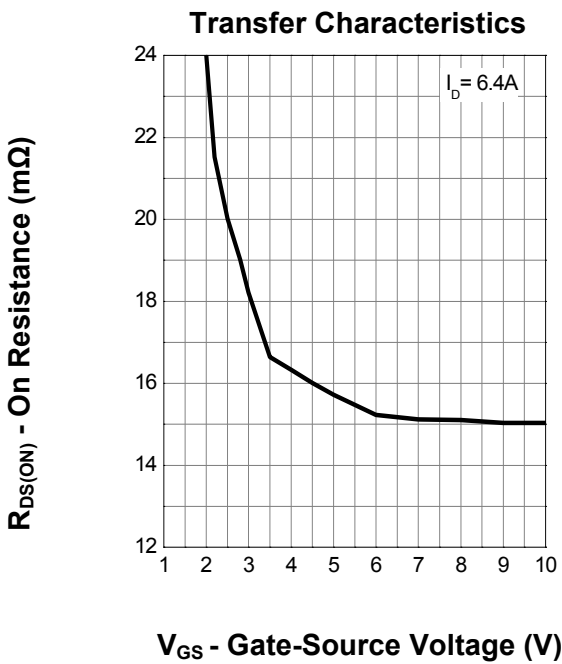
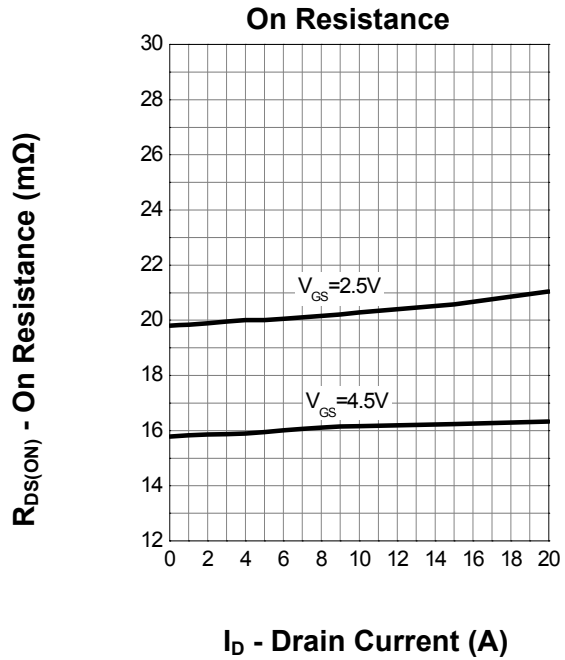
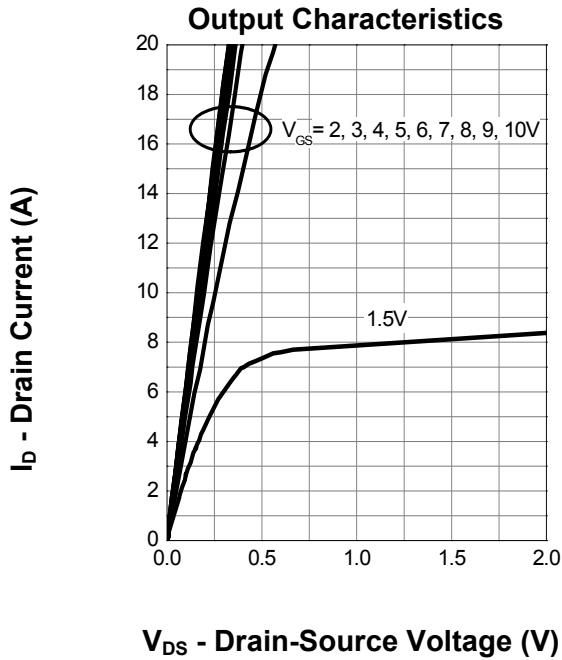


7. Typical Characteristics



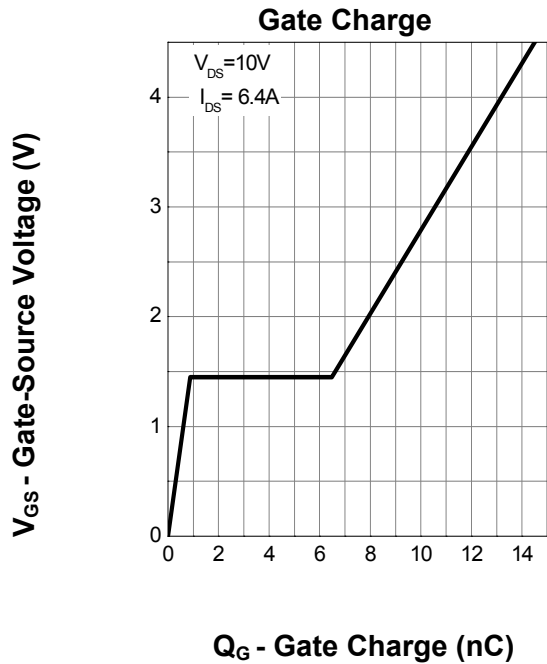
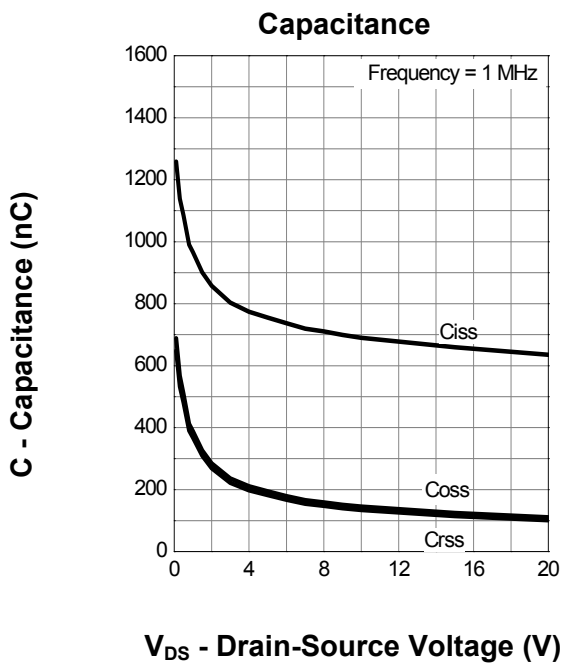
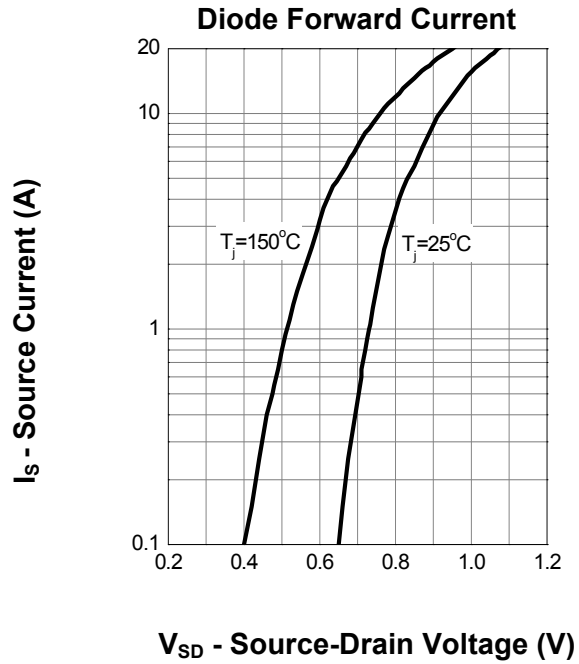
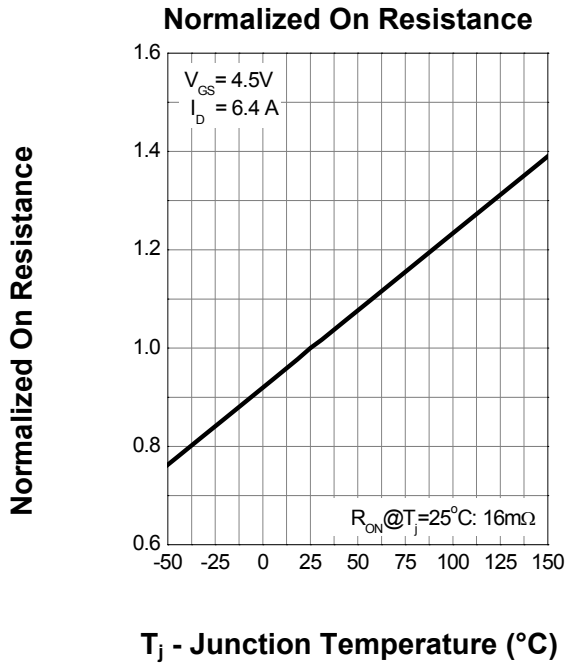


7. Typical Characteristics (cont.)





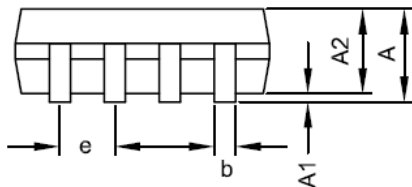
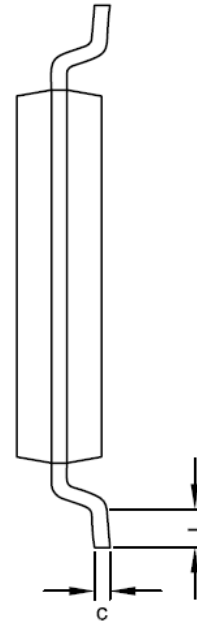
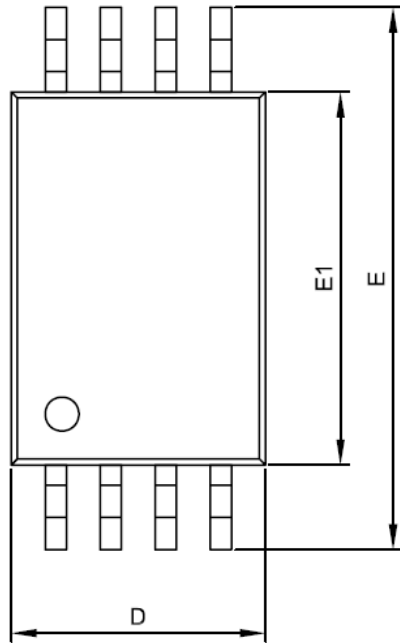
7. Typical Characteristics (cont.)





8. Package Dimensions

TSSOP-8



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