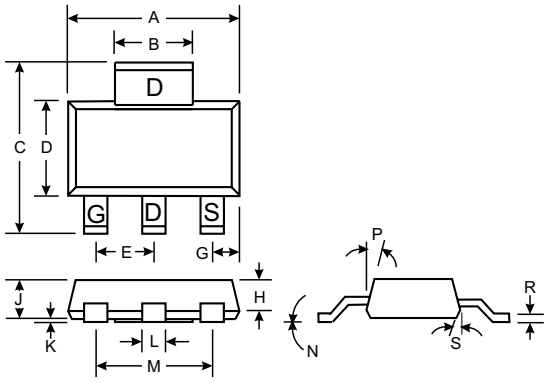
DT451N

N-CHANNEL ENHANCEMENT MODE FIELD EFFECT TRANSISTOR

Features

- High Cell Density DMOS Technology
- Low On-State Resistance
- High Power and Current Capability
- Fast Switching Speed
- High Transient Tolerance



SOT-223		
Dim	**Min**	**Max**
A	6.30	6.71
B	2.90	3.10
C	6.71	7.29
D	3.30	3.71
E	2.22	2.35
G	0.92	1.00
H	1.10	1.30
J	1.55	1.80
K	0.025	0.102
L	0.66	0.79
M	4.55	4.70
N	—	10°
P	10°	16°
R	0.254	0.356
S	10°	16°
All Dimensions in mm		

Mechanical Data

- SOT-223 Plastic Case
- Terminal Connections: See Outline Drawing and Internal Circuit Diagram Above

Maximum Ratings 25°C unless otherwise specified

Characteristic		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	30	V
Gate-Source Voltage		V_{GSS}	±20	V
Drain Current	Note 1a Continuous Pulsed	I_D	±5.5 ±25	A
Maximum Power Dissipation	Note 1a Note 1b Note 1c	P_d	3.0 1.3 1.1	W
Operating and Storage Temperature Range		T_j, T_{STG}	-65 to +150	°C

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	Note 1	$R_{\Theta JA}$	42	°C/W
Thermal Resistance, Junction-to-Case		$R_{\Theta JC}$	12	°C/W

Notes: 1. $R_{\Theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\Theta JC}$ is guaranteed by design while $R_{\Theta CA}$ is determined by the user's board design.

1a. With 1 in² oz 2 oz. copper mounting pad $R_{\Theta JA}$ = 42°C/W.

1b. With 0.0066 in² oz 2 oz. copper mounting pad $R_{\Theta JA}$ = 95°C/W.

1c. With 0.0123 in² oz 2 oz. copper mounting pad $R_{\Theta JA}$ = 110°C/W.

Electrical Characteristics 25°C unless otherwise specified

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	30	—	—	V	V_{GS} = 0V, I_D = 250µA
Zero Gate Voltage Drain Current T_j =55°C	I_{DSS}	—	—	2.0 20	µA	VDS = 24V, V_{GS} = 0V
Gate-Body Leakage, Forward	I_{GSSF}	—	—	100	nA	V_{GS} = 20V, V_{DS} = 0V
Gate-Body Leakage, Reverse	I_{GSSR}	—	—	-100	nA	V_{GS} = -20V, V_{DS} = 0V
ON CHARACTERISTICS (Note 2)						
Gate Threshold Voltage T_j = 125°C	$V_{GS(th)}$	1.0 0.7	1.6 1.2	3.0 2.2	V	V_{DS} = V_{GS}, I_D = 250µA
Static Drain-Source On-Resistance T_j = 125°C	$R_{DS\ (ON)}$	—	0.042 0.065 0.064	0.05 0.10 0.08	Ω	V_{GS} = 10V, I_D = 5.5A V_{GS} = 4.5V, I_D = 4.3A
On-State Drain Current	$I_{D(ON)}$	18 15	—	—	A	V_{GS} = 10V, V_{DS} = 5.0V V_{GS} = 4.5V, V_{DS} = 5.0V
Forward Transconductance	g_{FS}	—	6.0	—	m	V_{DS} = 10V, I_D = 5.5A
DYNAMIC CHACTERISTICS						
Input Capacitance	C_{ISS}	—	730	—	pF	V_{DS} = 10V, V_{GS} = 0V f = 1.0MHz
Output Capacitance	C_{OSS}	—	370	—	pF	
Reverse Transfer Capacitance	C_{RSS}	—	140	—	pF	
SWITCHING CHARACTERISTICS (Note 2)						
Turn-On Delay Time	$t_{D(ON)}$	—	20	30	ns	V_{DD} = 15V, I_D = 1.0A V_{GEN} = 10V, R_{GEN} = 6.0Ω
Turn-On Rise Time	t_r	—	15	25	ns	
Turn-Off Delay Time	$t_{D(OFF)}$	—	19	40	ns	
Turn-Off Fall Time	t_f	—	10	30	ns	
Total Gate Charge	Q_g	—	16	25	nC	V_{DS} = 10V. I_D = 5.5A. V_{GS} = 10V
Gate-Source Charge	Q_{gs}	—	1.8	3	nC	
Gate-Drain Charge	Q_{gd}	—	4.5	7.0	nC	
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Max Continuous Drain-Source Diode Forward Current	I_S	—	—	2.5	A	
Drain-Source Diode Forward Voltage	V_{SD}	—	0.8	1.2	V	V_{GS} = 0V, I_S = 5.5A (Note 2)

Notes: 2. Pulse Test: Pulse width ≤ 300µs, duty cycle ≤ 2.0%.

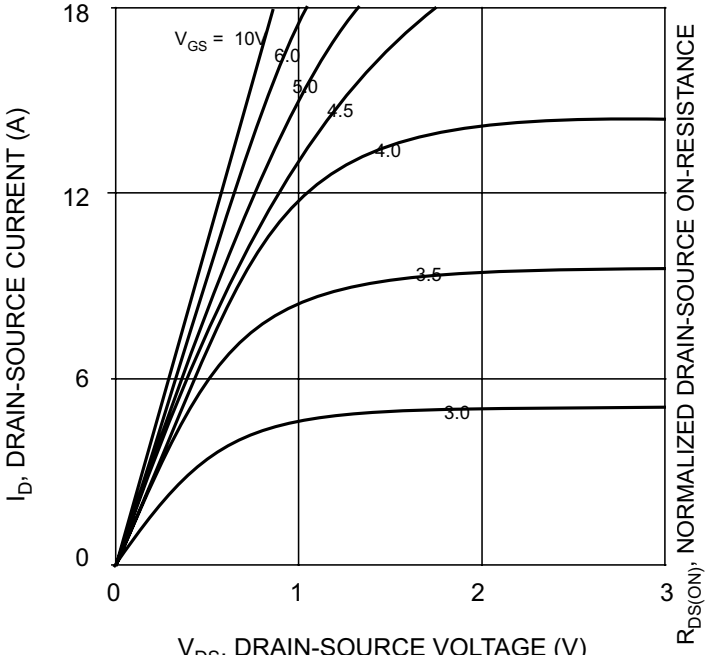


Fig. 1, On-Region Characteristics

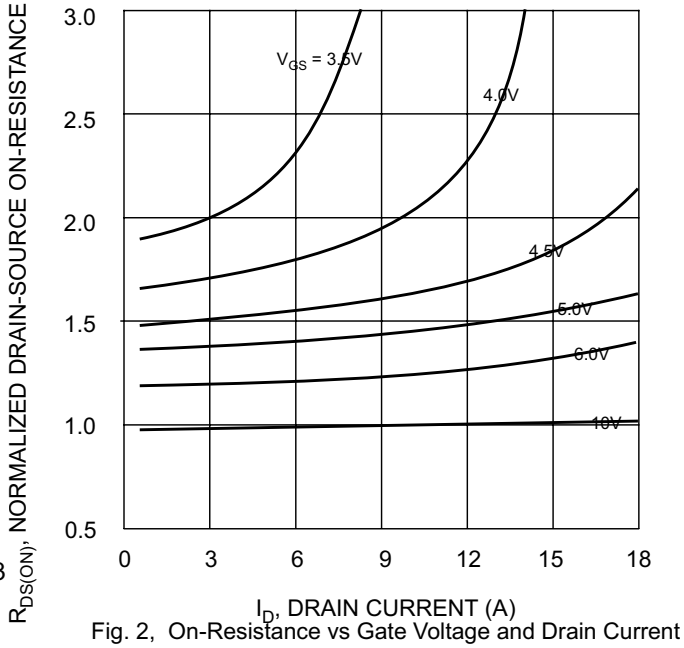


Fig. 2, On-Resistance vs Gate Voltage and Drain Current

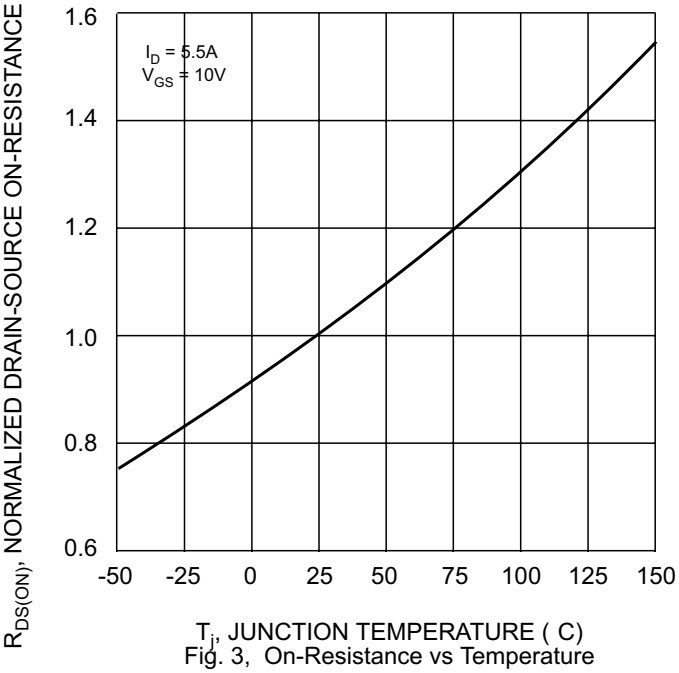


Fig. 3, On-Resistance vs Temperature

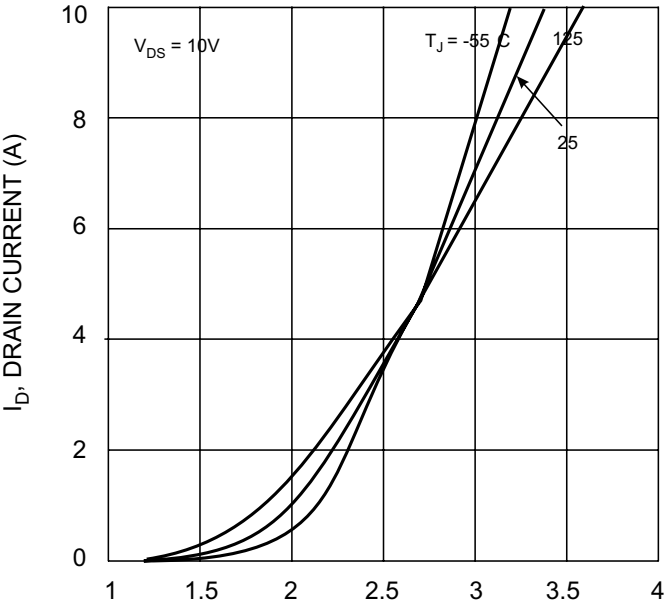


Fig. 4, Transfer Characteristics

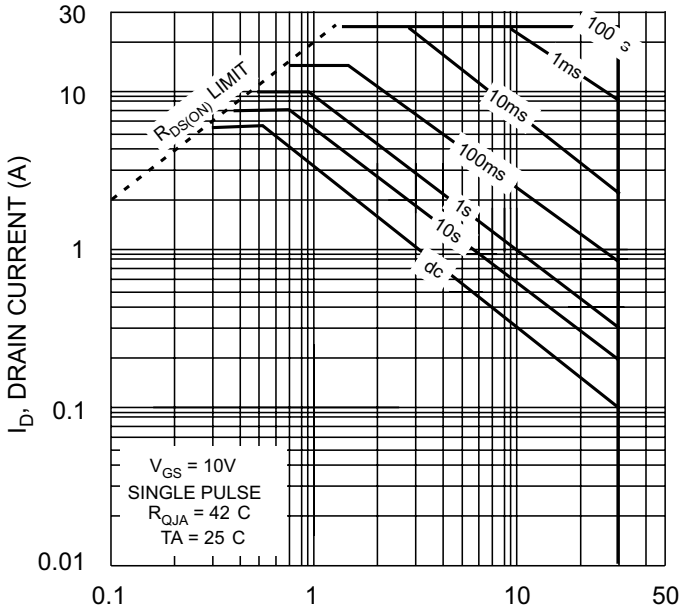


Fig. 5, Maximum Safe Operating Area

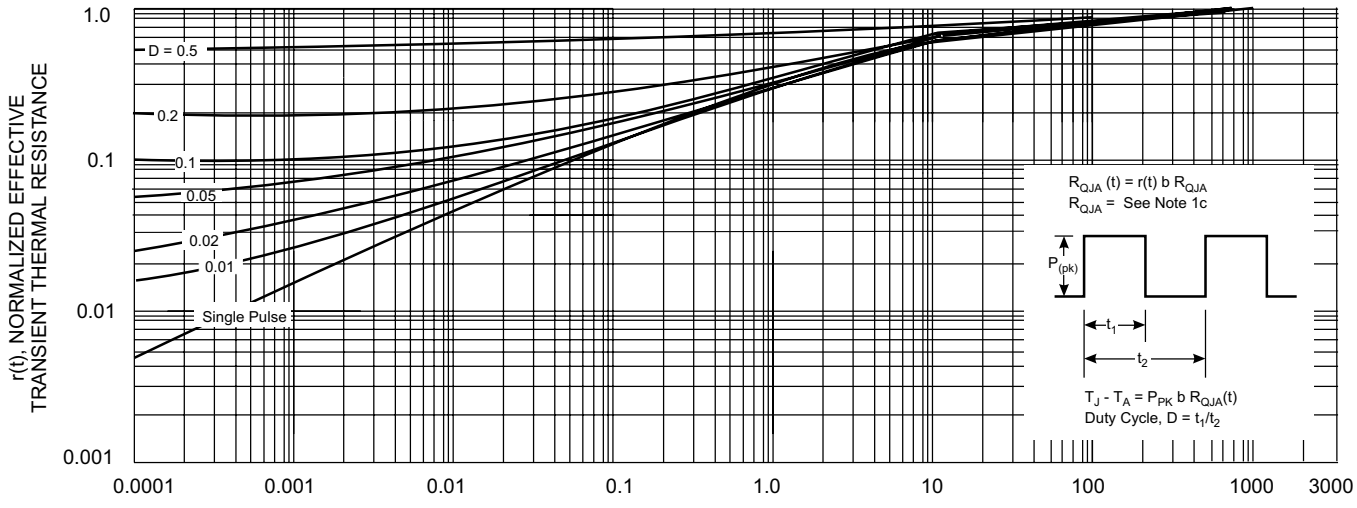


Fig. 6, Typical Normalized Transient Thermal Impedance Curves

Remark: Thermal characterization performed under conditions described in note 1c. Transient thermal response will change depending on the circuit board design.