

# DP1013KT

## DP1013KT P-Channel Enhancement Mode Field Effect Transistor

### General description

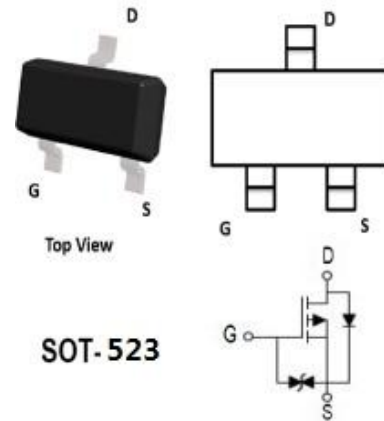
P-Channel Enhancement Mode Field Effect Transistor

### Features:

- $V_{DS} : -20V$
- $I_D : -0.65A$
- $R_{DS(ON)}$ ( at  $V_{GS}=-4.5V$ )  $< 450$  mohm
- $R_{DS(ON)}$ ( at  $V_{GS}=-2.5V$ )  $< 600$  mohm

### Applications

- Power Management in Note book
- Portable Equipment
- Battery Powered System



### Device Marking Code:

Device Type	Device Marking
DP1013KT	39K

DP1013KT

### Absolute Maximum Ratings (TA=25°C unless otherwise noted)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-20	V
$V_{GS}$	Gate-Source Voltage	$\pm 10$	V
$I_D$	Drain Current – Continuous ( $T_A=25^\circ C$ )	-650	mA
	Drain Current – Continuous ( $T_A=70^\circ C$ )	-320	mA
$I_{DM}$	Drain Current – Pulsed <sup>1</sup>	-1.6	A
$P_D$	Power Dissipation ( $T_A=25^\circ C$ )	312	mW
	Power Dissipation – Derate above 25°C	2.5	mW/°C
$T_{STG}$	Storage Temperature Range	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	°C

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	400	°C/W

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## Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)

### Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-20	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =-1mA	---	-0.01	---	V/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	-1	uA
		V <sub>DS</sub> =-16V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C	---	---	-10	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±10V, V <sub>DS</sub> =0V	---	---	±20	uA

### On Characteristics

R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-0.5A	---	350	450	m
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-0.3A	---	450	600	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	-0.4	-0.65	-1.2	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	3	---	mV/°C

### Dynamic and switching Characteristics

Q <sub>g</sub>	Total Gate Charge <sup>2, 3</sup>	V <sub>DS</sub> =-10V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-0.2A	---	1		nC
Q <sub>gs</sub>	Gate-Source Charge <sup>2, 3</sup>		---	0.28		
Q <sub>gd</sub>	Gate-Drain Charge <sup>2, 3</sup>		---	0.18		
T <sub>d(on)</sub>	Turn-On Delay Time <sup>2, 3</sup>	V <sub>DD</sub> =-10V, V <sub>GS</sub> =-4.5V, R <sub>G</sub> =10 I <sub>D</sub> =-0.2A	---	8		ns
T <sub>r</sub>	Rise Time <sup>2, 3</sup>		---	5.2		
T <sub>d(off)</sub>	Turn-Off Delay Time <sup>2, 3</sup>		---	30		
T <sub>f</sub>	Fall Time <sup>2, 3</sup>		---	18		
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-10V, V <sub>GS</sub> =0V, F=1MHz	---	40		pF
C <sub>oss</sub>	Output Capacitance		---	15		
C <sub>rss</sub>	Reverse Transfer Capacitance		---	6.5		

### Drain-Source Diode Characteristics and Maximum Ratings

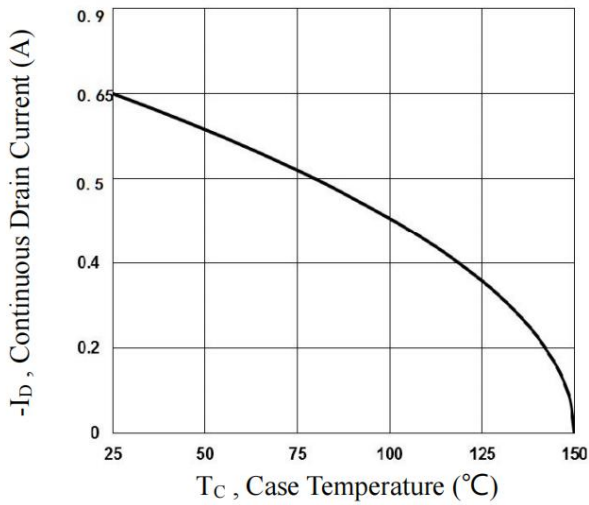
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	-0.65	A
I <sub>SM</sub>	Pulsed Source Current		---	---	-1.3	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =-0.2A, T <sub>J</sub> =25°C	---	---	-1.3	V

#### Notes:

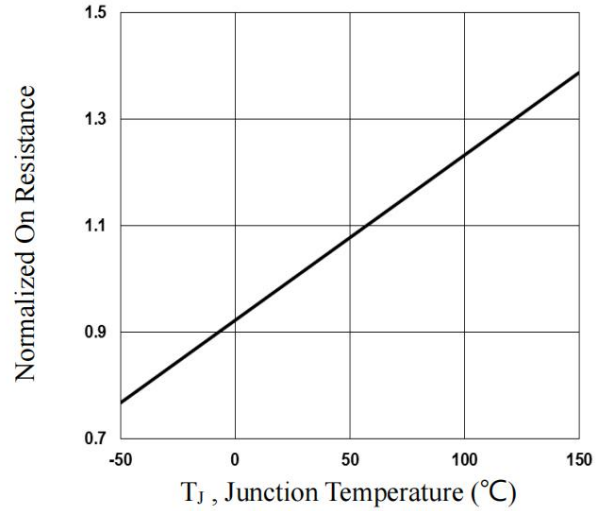
- Repetitive Rating: Pulse width limited by maximum junction temperature.
- Pulse Test: Pulse Width≤300us, Duty Cycle≤ 2%.
- Essentially independent of operating temperature.

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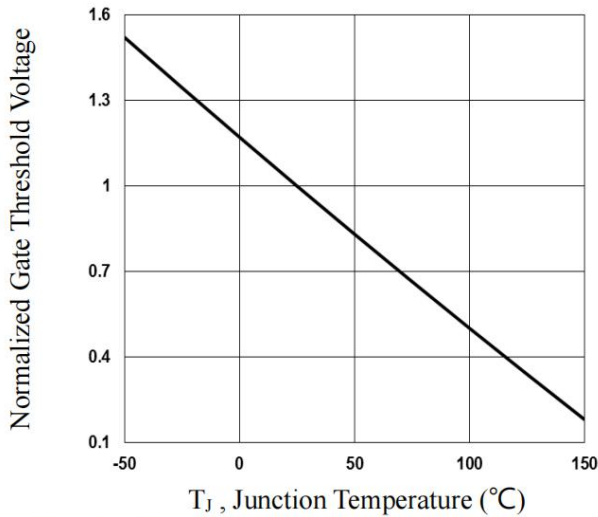
## Typical Performance Characteristics



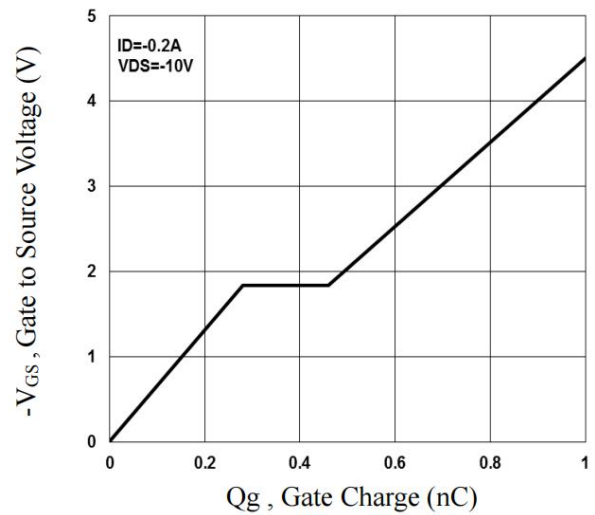
**Fig.1 Continuous Drain Current vs.  $T_c$**



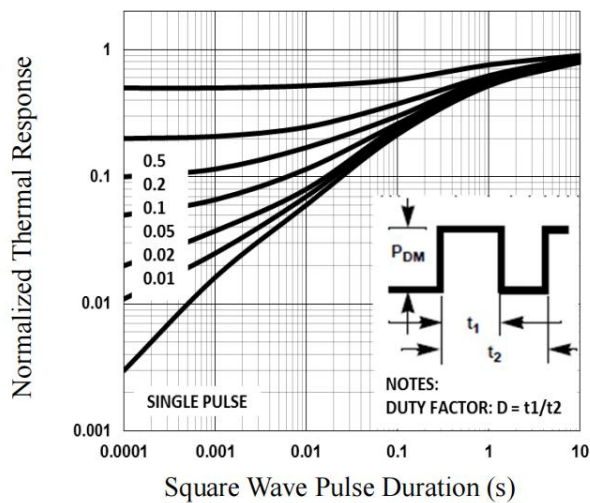
**Fig.2 Normalized  $R_{DS(on)}$  vs.  $T_j$**



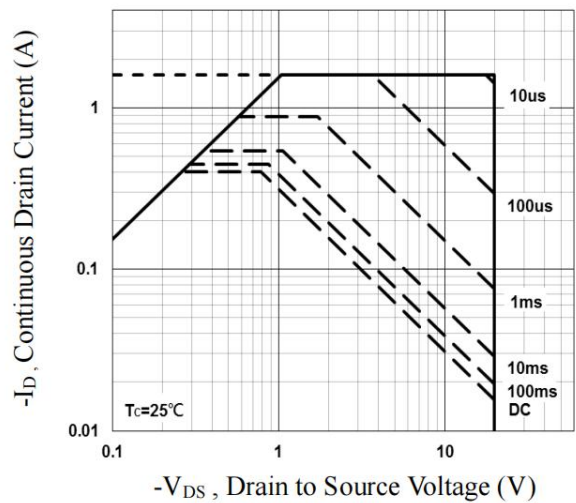
**Fig.3 Normalized  $V_{th}$  vs.  $T_j$**



**Fig.4 Gate Charge Waveform**

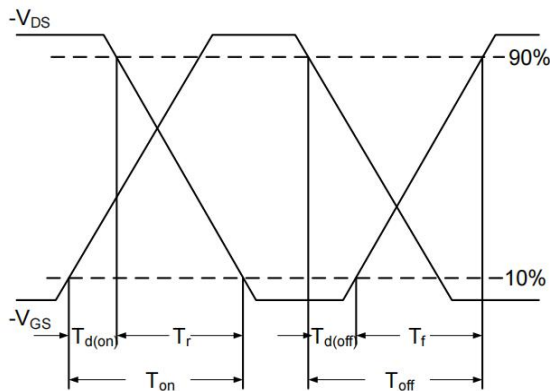


**Fig.5 Normalized Transient Response**

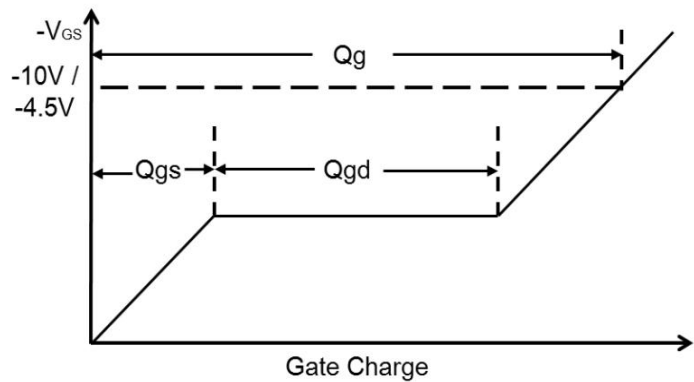


**Fig.6 Maximum Safe Operation Area**

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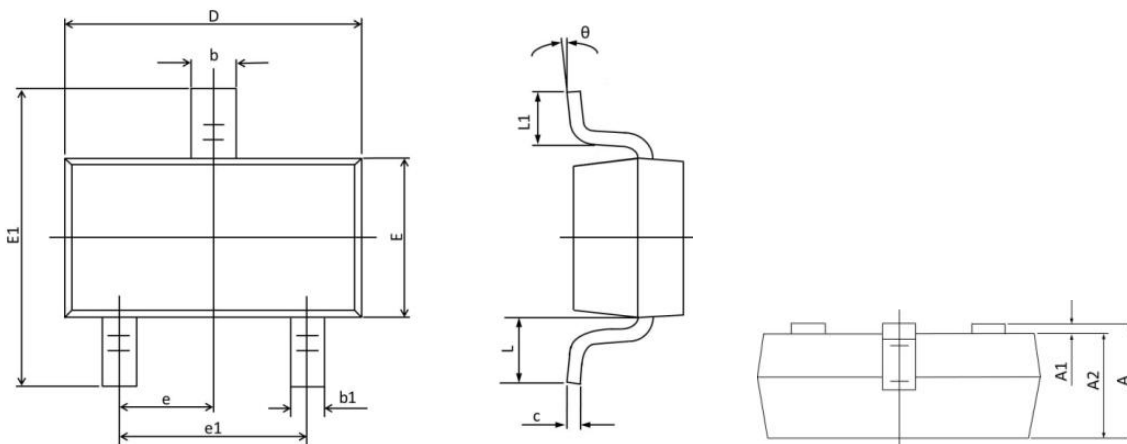


**Fig.7 Switching Time Waveform**



**Fig.8 Gate Charge Waveform**

## SOT-523 Package Outline



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MAX	MIN	MAX	MIN
A	0.900	0.700	0.035	0.028
A1	0.100	0.000	0.004	0.000
A2	0.800	0.700	0.031	0.028
b	0.350	0.250	0.014	0.010
b1	0.250	0.150	0.010	0.006
c	0.200	0.100	0.008	0.004
D	1.750	1.500	0.069	0.059
E	0.900	0.700	0.035	0.028
E1	1.750	1.400	0.069	0.055
e	0.5TYP.		0.02TYP.	
e1	1.100	0.900	0.043	0.035
L	0.460	0.300	0.018	0.012
L1	0.460	0.260	0.018	0.010
θ	8°	0°	8°	0°

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