

P-Channel Enhancement Mode MOSFET

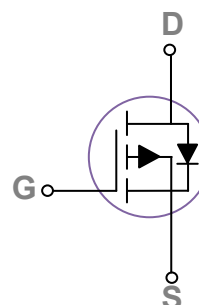
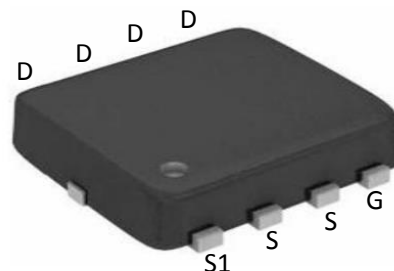
Description:

This P-Channel MOSFET uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge.

It can be used in a wide variety of applications.

Features:

- 1) $V_{DS}=-20V, I_D=-45A, R_{DS(on)} < 7m\ \Omega @ V_{GS}=-4.5V$
- 2) Low gate charge.
- 3) Green device available.
- 4) Advanced high cell density trench technology for ultra $R_{DS(on)}$.
- 5) Excellent package for good heat dissipation.



Absolute Maximum Ratings: ($T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 12	V
I_D	Continuous Drain Current	-45	A
	Continuous Drain Current- $T_C=100^\circ\text{C}$	-35	
	Pulsed Drain Current ¹	-200	
E_{AS}	Single Pulse Avalanche Energy	---	mJ
P_D	Power Dissipation	80	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

Thermal Characteristics:

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case ²	1.6	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	---	

Package Marking and Ordering Information:

Part NO.	Marking	Package
CSD25402Q3A	D25402	DFN3*3

 Electrical Characteristics: ($T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu\text{A}$	-20	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=-16V$	---	---	1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0A$	---	---	± 100	nA
On Characteristics						
$V_{GS(th)}$	GATE-Source Threshold Voltage ³	$V_{GS}=V_{DS}, I_D=250\ \mu\text{A}$	-0.4	-0.6	-1	V
$R_{DS(ON)}$	Drain-Source On Resistance ³	$V_{GS}=-4.5V, I_D=-20A$	---	5.8	7	m Ω
		$V_{GS}=-2.5V, I_D=-20A$	---	7.2	9	
G_{FS}	Forward Transconductance ³	$V_{DS}=-5V, I_D=-20A$	80	---	---	S
Dynamic Characteristics						
C_{iss}	Input Capacitance ⁴	$V_{DS}=-10V, V_{GS}=0V, f=1\text{MHz}$	---	3500	---	pF
C_{oss}	Output Capacitance ⁴		---	577	---	
C_{rss}	Reverse Transfer Capacitance ⁴		---	445	---	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time ⁴	$V_{DD}=-10V, I_D=-A,$ $R_{GEN}=3\ \Omega, V_{GS}=-4.5V$	---	18	---	ns
t_r	Rise Time ⁴		---	42	---	ns
$t_{d(off)}$	Turn-Off Delay Time ⁴		---	85	---	ns
t_f	Fall Time ⁴		---	23	---	ns
Q_g	Total Gate Charge ⁴	$V_{GS}=-4.5V, V_{DS}=-10V,$ $I_D=-20A$	---	55	---	nC
Q_{gs}	Gate-Source Charge ⁴		---	10	---	nC
Q_{gd}	Gate-Drain "Miller" Charge ⁴		---	15	16	nC
Drain-Source Diode Characteristics						

V_{SD}	Source-Drain Diode Forward Voltage ³	$V_{GS}=0V, I_S=-20A, T_J=25^\circ C$	---	---	-1.2	V
I_S	Diode Forward Current ²	---	---	-45	A	
T_{rr}	Reverse Recovery Time ³	$T_J = 25^\circ C, I_F = -10A$ $di/dt = 100A/\mu s$ ^(Note3)	47	---	Ns	
q_{rr}	Reverse Recovery Charge ³		53	---	nc	

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

Typical Characteristics: ($T_C=25^\circ C$ unless otherwise noted)

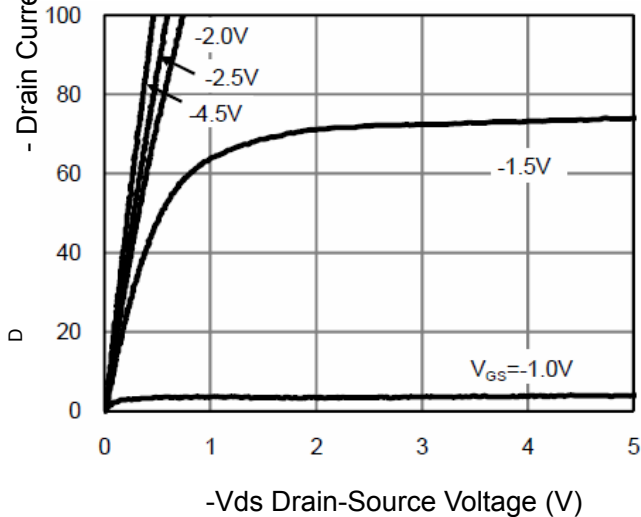


Figure 1 Output Characteristics

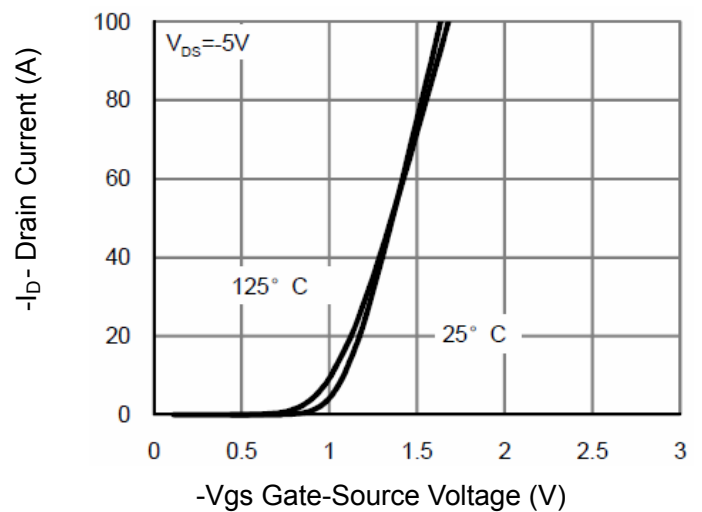


Figure 2 Transfer Characteristics

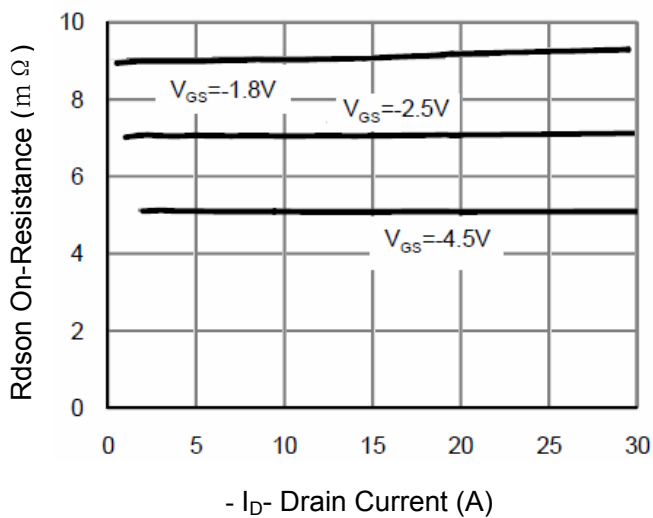


Figure 3 Rdson- Drain Current

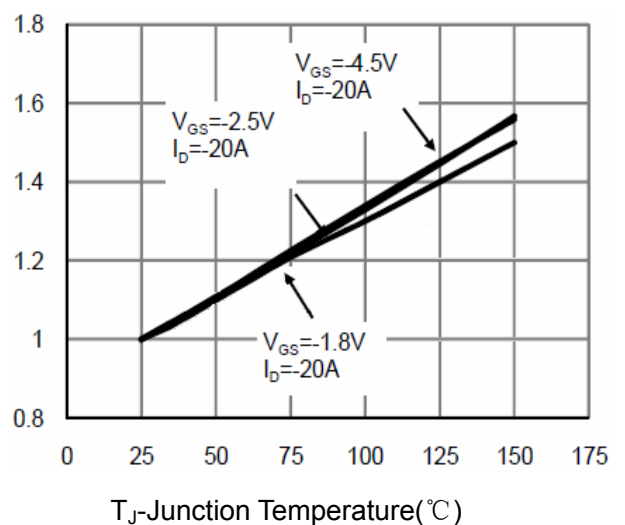


Figure 4 Rdson-Junction Temperature

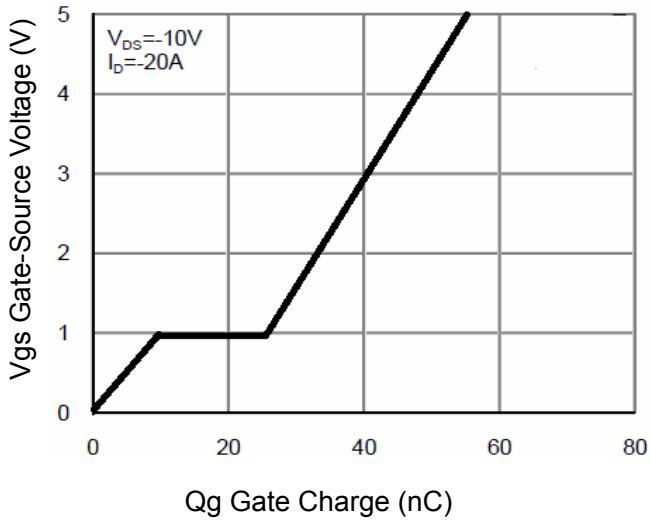


Figure 5 Gate Charge

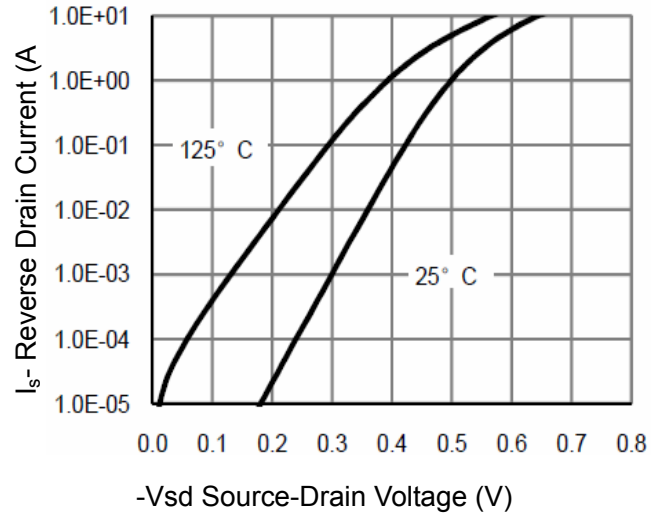


Figure 6 Source- Drain Diode Forward

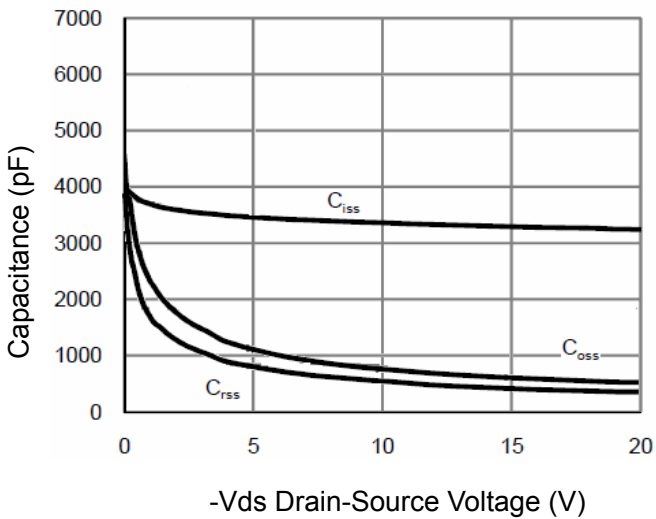


Figure 7 Capacitance vs Vds

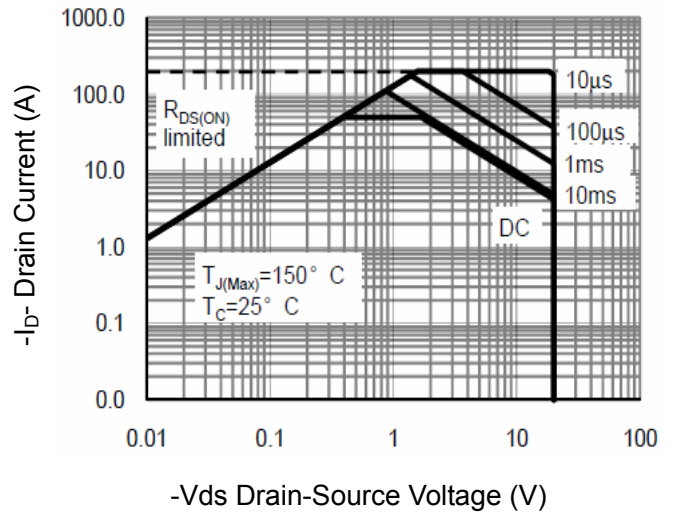


Figure 8 Safe Operation Area

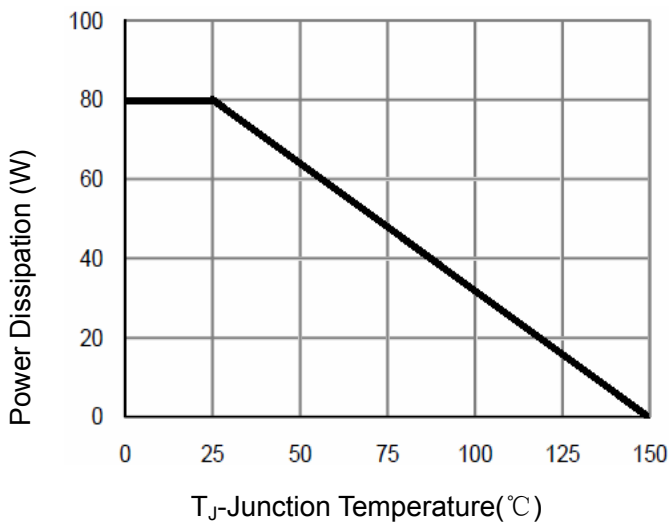


Figure 9 Power De-rating

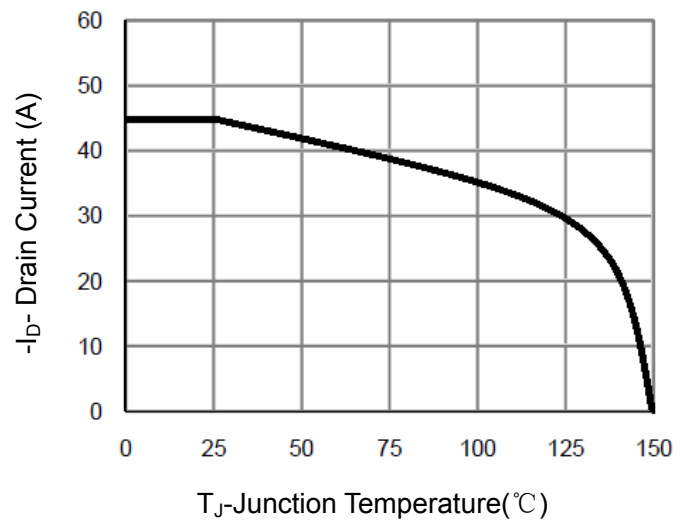


Figure 10 -Current De-rating

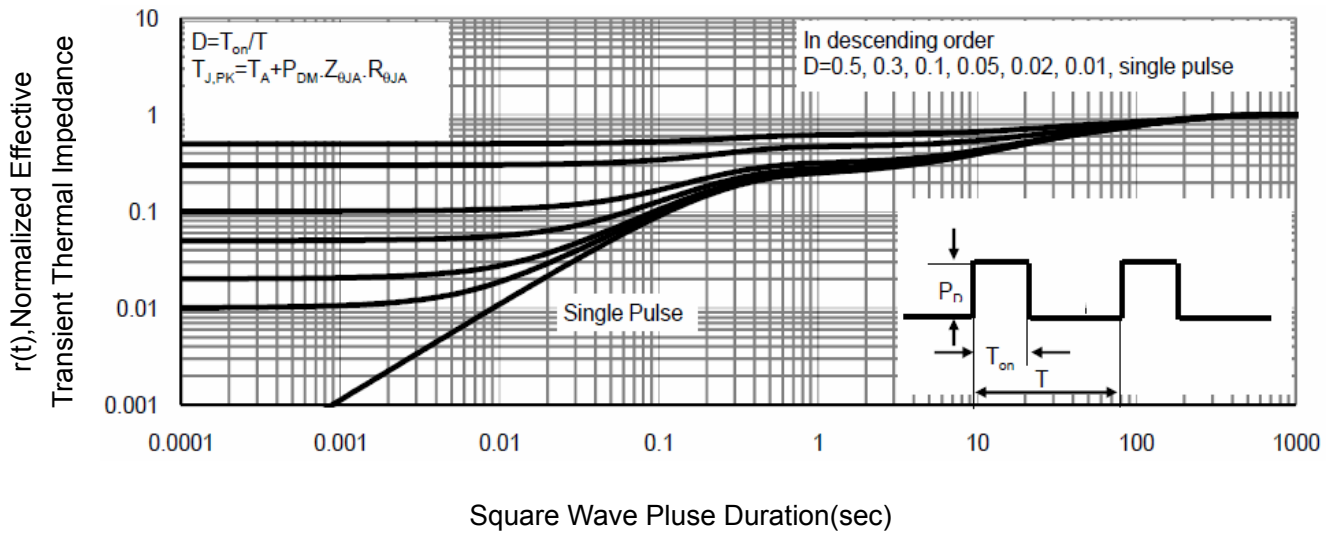


Figure 11 Normalized Maximum Transient Thermal Impedance