

General Description

The HSCA1002 is the highest performance trench N-ch MOSFETs with extreme high cell density , which provide excellent RDSON and gate charge for most of the small power switching and load switch applications.

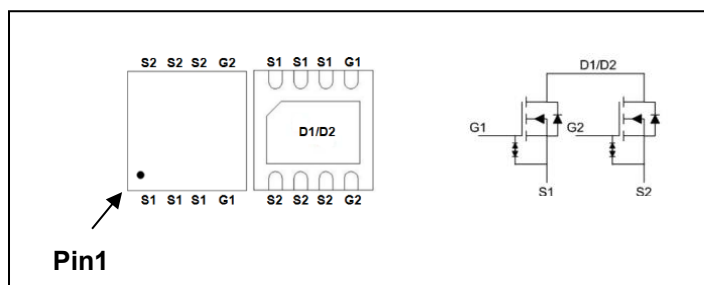
The HSCA1002 meet the RoHS and Green Product requirement with full function reliability approved.

- Green Device Available
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- Advanced high cell density Trench technology

Product Summary

V_{DS}	12	V
$R_{DS(ON),max}$	4.3	mΩ
I_D	56	A

DFN3x3 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	12	V
V_{GS}	Gate-Source Voltage	± 8	V
$I_D@T_C=25^{\circ}C$	Continuous Drain Current, V_{GS} @ 4.5V ₁	56	A
$I_D@T_C=100^{\circ}C$	Continuous Drain Current, V_{GS} @ 4.5V ₁	35.6	A
$I_D@T_A=25^{\circ}C$	Continuous Drain Current, V_{GS} @ 4.5V ₁	19	A
$I_D@T_A=70^{\circ}C$	Continuous Drain Current, V_{GS} @ 4.5V ₁	15	A
I_{DM}	Pulsed Drain Current ₂	100	A
$P_D@T_C=25^{\circ}C$	Total Power Dissipation ₁	31	W
$P_D@T_A=25^{\circ}C$	Total Power Dissipation ₁	3.6	W
T_{STG}	Storage Temperature Range	-55 to 150	$^{\circ}C$
T_J	Operating Junction Temperature Range	-55 to 150	$^{\circ}C$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ₁	---	35	$^{\circ}C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ₁	---	4	$^{\circ}C/W$

N-Channel Electrical Characteristics ($T_J=25\text{ }^{\circ}\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V$, $I_D=250\mu A$	12	---	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=4.5V$, $I_D=3A$	2.3	3.3	4.3	m Ω
		$V_{GS}=4V$, $I_D=3A$	2.4	3.4	4.4	
		$V_{GS}=3.1V$, $I_D=3A$	2.6	3.6	4.7	
		$V_{GS}=2.5V$, $I_D=3A$	3	4	5.6	
		$V_{GS}=1.8V$, $I_D=3A$	4	5.4	7.6	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	0.4	---	1.0	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=12V$, $V_{GS}=0V$, $T_J=25^{\circ}\text{C}$	---	---	1	μA
		$V_{DS}=12V$, $V_{GS}=0V$, $T_J=55^{\circ}\text{C}$	---	---	5	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 8V$, $V_{DS}=0V$	---	---	± 10	μA
g_{fs}	Forward Transconductance	$V_{DS}=5V$, $I_D=3A$	---	42	---	S
Q_g	Total Gate Charge (4.5V)	$V_{DS}=10V$, $I_D=3A$	---	38	---	nC
	Total Gate Charge (3.9V)		---	33	---	
Q_{gs}	Gate-Source Charge		---	4.5	---	
Q_{gd}	Gate-Drain Charge		---	12	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=10V$, $V_{GS}=4.5V$, $R_G=6\Omega$ $I_D=3A$	---	22	---	ns
T_r	Rise Time		---	41	---	
$T_{d(off)}$	Turn-Off Delay Time		---	77	---	
T_f	Fall Time		---	21	---	
C_{iss}	Input Capacitance	$V_{DS}=10V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	3165	---	pF
C_{oss}	Output Capacitance		---	380	---	
C_{rss}	Reverse Transfer Capacitance		---	325	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current ¹	$V_G=V_D=0V$, Force Current	---	---	30	A
I_{SM}	Pulsed Source Current ²		---	---	100	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V$, $I_S=3A$, $T_J=25^{\circ}\text{C}$	---	---	1.2	V

Note :

1.The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper, $t \leq 10s$.

2.The data tested by pulsed , pulse width $\leq 10\mu s$, duty cycle $\leq 1\%$

Typical Characteristics

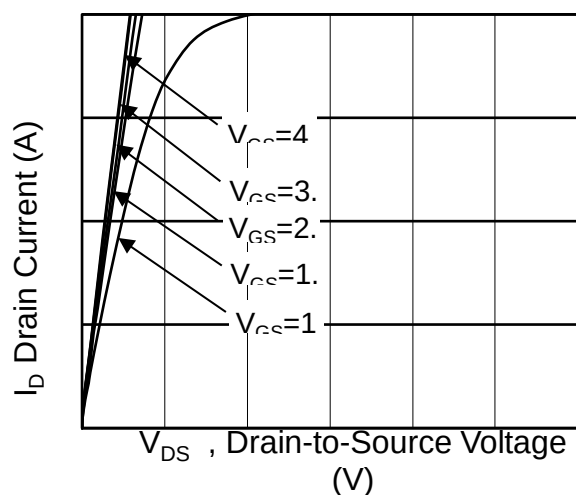


Fig.1 Typical Output Characteristics

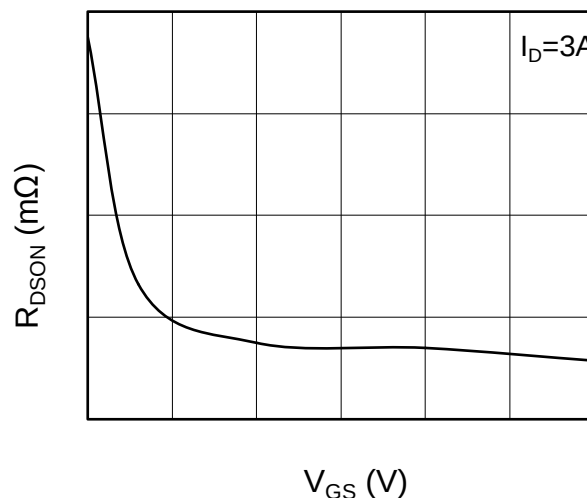


Fig.2 On-Resistance vs. Gate-Source

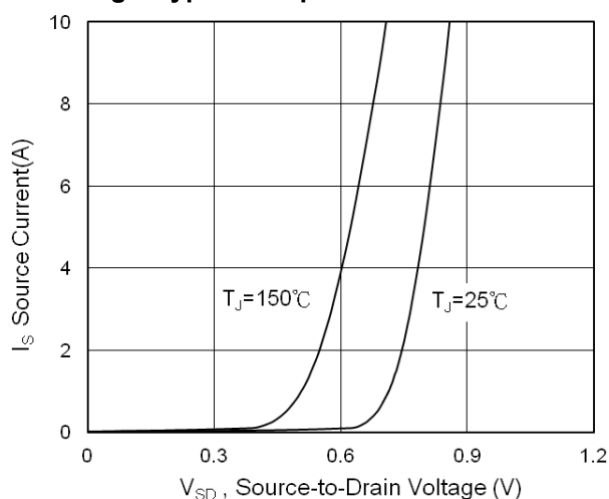


Fig.3 Forward Characteristics Of Reverse

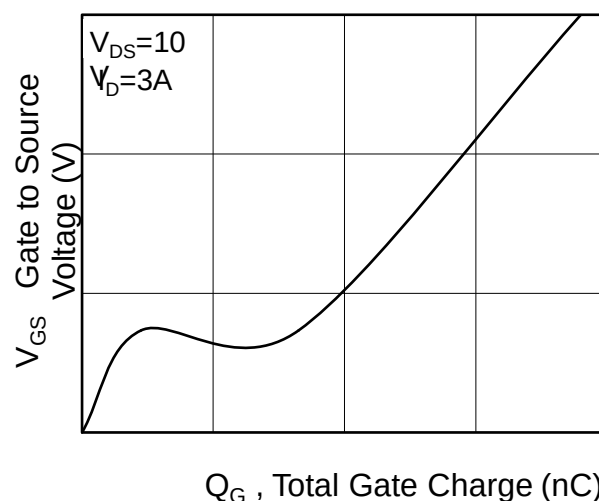


Fig.4 Gate-Charge Characteristics

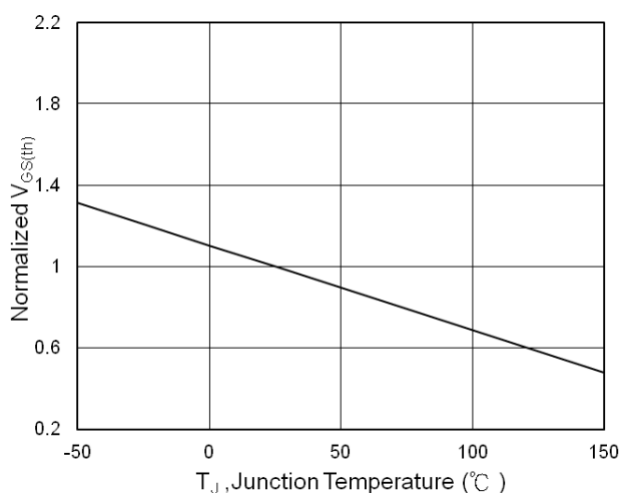


Fig.5 $V_{GS(th)}$ vs. T_J

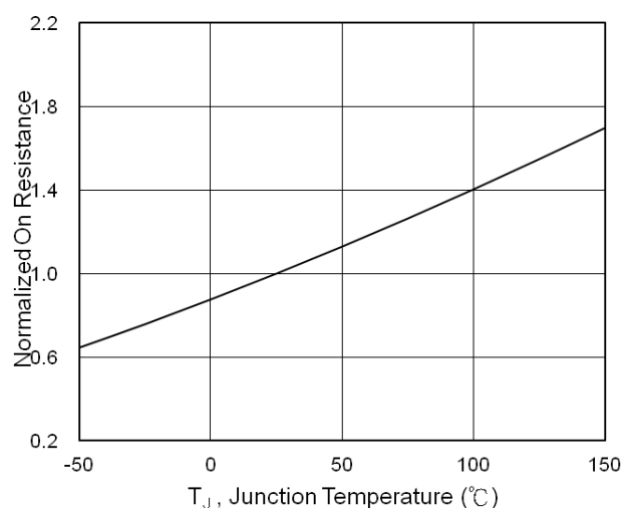


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

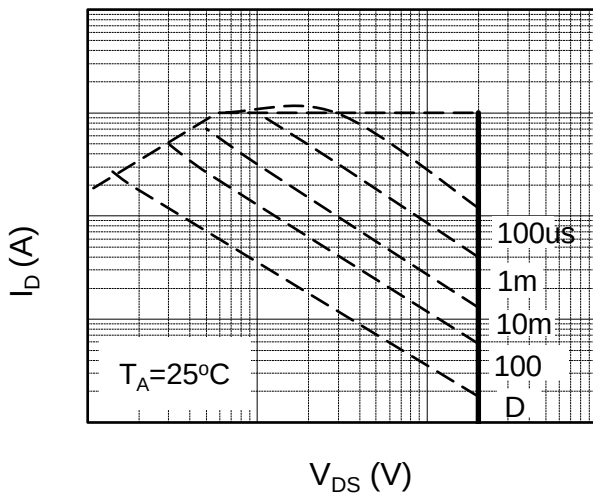


Fig.7 Capacitance

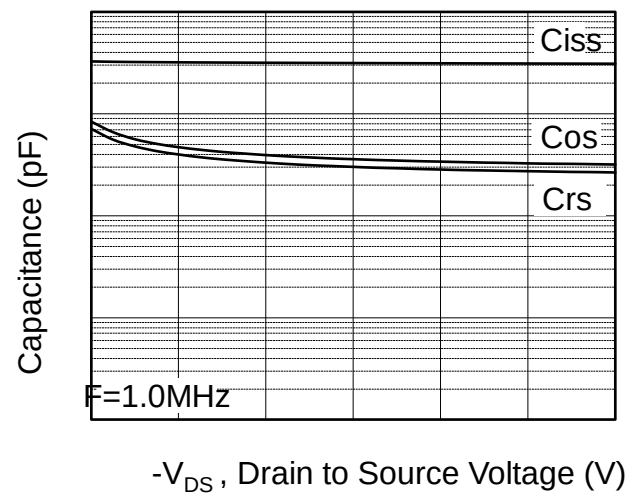


Fig.8 Safe Operating Area

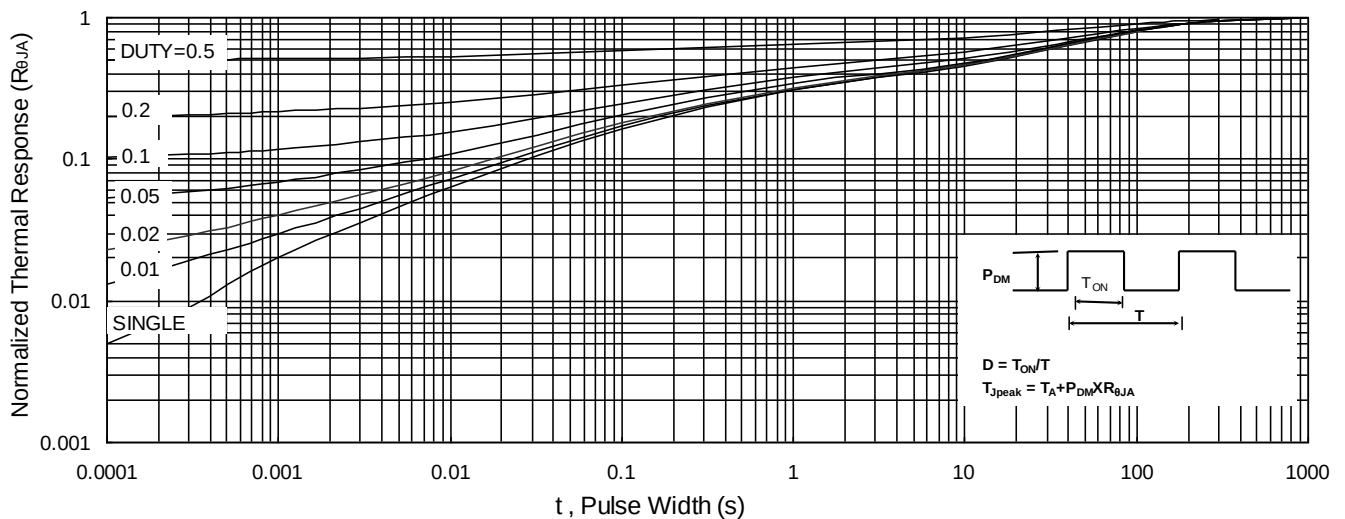


Fig.9 Normalized Maximum Transient Thermal Impedance

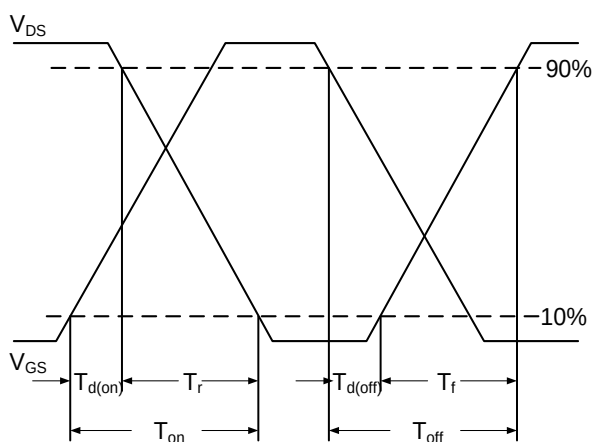


Fig.10 Switching Time Waveform

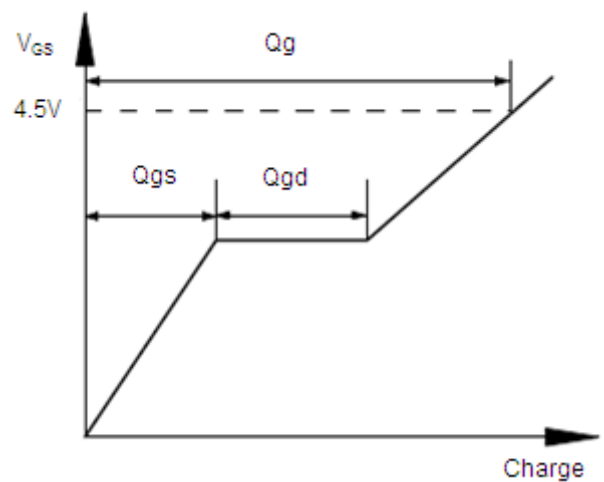
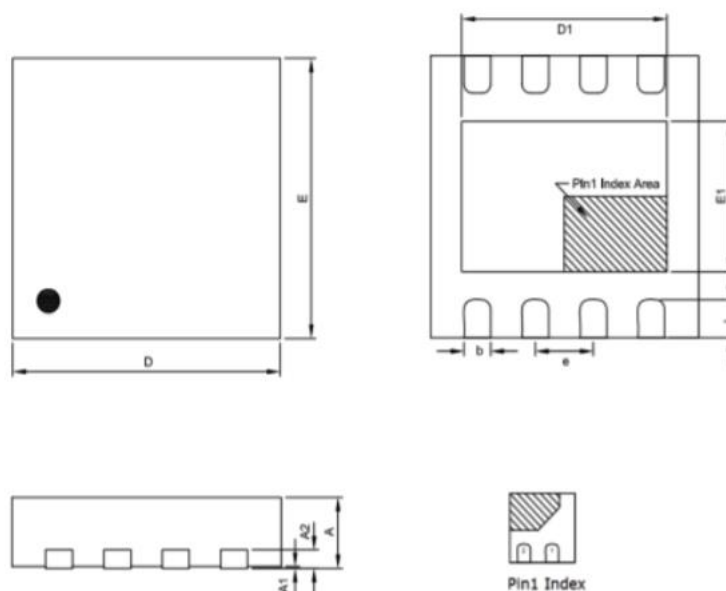


Fig.11 Gate Charge Waveform

DFN3x3 Package Outline Dimensions



SYMBOLS	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.75	0.80	0.0276	0.0295	0.0315
A1	0.00	--	0.05	0.000	--	0.002
A2	0.19	0.20	0.21	0.0075	0.0079	0.0083
D	2.90	3.00	3.10	0.114	0.118	0.122
E	2.90	3.00	3.10	0.114	0.118	0.122
D1	2.25	2.30	2.35	0.0886	0.0906	0.0925
E1	1.55	1.6	1.65	0.061	0.063	0.065
L	0.35	0.40	0.45	0.0138	0.0177	0.0207
b	0.25	0.30	0.35	0.0098	0.0118	0.0138
e	--	0.65	--	--	0.0256	--