freescale
飞思卡尔(深圳)功率半导体有限公司

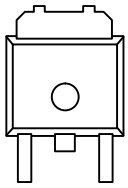
SUD40N04-10A

N-Channel

40 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)[a]
40	0.010 @ V_{GS} = 10 V	40
	0.014 @ V_{GS} = 4.5 V	40

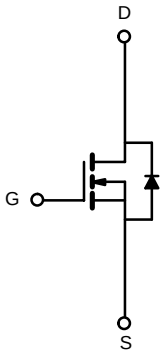
TO-252



Top View

Order Number:
SUD40N04-10A

Drain Connected to Tab



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C UNLESS OTHERWISE NOTED)				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current (T_J = 175°C)	T_C = 25°C	I_D	40[a]	A
	T_C = 100°C		40[a]	
Pulsed Drain Current		I_{DM}	100	
Avalanche Current		I_{AR}	30	
Repetitive Avalanche Energy[b]	L = 0.1 mH	E_{AR}	45	mJ
Power Dissipation	T_C = 25°C	P_D	71[c]	W
Operating Junction and Storage Temperature Range		T_J, T_{stg}	–55 to 175	°C

THERMAL RESISTANCE RATINGS					
Parameter		**Symbol**	**Typical**	**Maximum**	**Unit**
Junction-to-Ambient[d]	t ≤ 10 sec.	R_{thJA}	15	18	°C/W
	Steady State		40	50	
Junction-to-Case		R_{thJC}	1.75	2.1	

Notes:
a. Package limited.
b. Duty cycle ≤ 1%.
c. See SOA curve for voltage derating.
d. Surface mounted on 1" FR4 board.

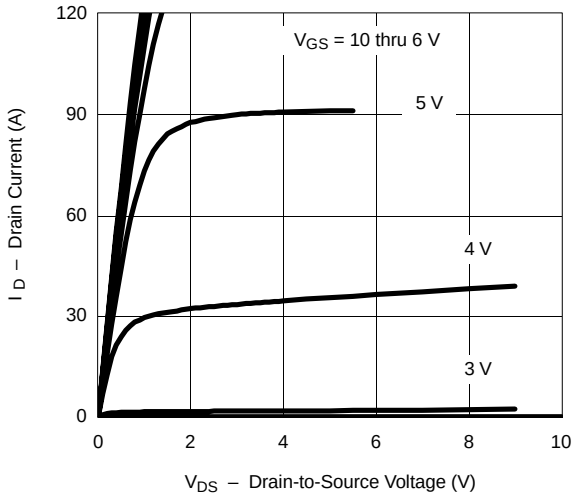
SPECIFICATIONS (T_J = 25°C UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 µA	40			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_{DS} = 250 µA	1		3	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 32 V, V_{GS} = 0 V			1	µA
		V_{DS} = 32 V, V_{GS} = 0 V, T_J = 125°C			50	
		V_{DS} = 32 V, V_{GS} = 0 V, T_J = 175°C			150	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = 5 V, V_{GS} = 10 V	40			A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 40 A		0.0075	0.010	Ω
		V_{GS} = 10 V, I_D = 40 A, T_J = 125°C		0.012	0.016	
		V_{GS} = 10 V, I_D = 40 A, T_J = 175°C		0.015	0.020	
		V_{GS} = 4.5 V, I_D = 10 A		0.011	0.014	
		V_{GS} = 4.5 V, I_D = 10 A, T_J = 125°C		0.018	0.022	
		V_{GS} = 4.5 V, I_D = 10 A, T_J = 175°C		0.022	0.028	
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 40 A	20	40		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		1700		pF
Output Capacitance	C_{oss}			370		
Reversen Transfer Capacitance	C_{rss}			145		
Total Gate Charge[c]	Q_g	V_{DS} = 20 V, V_{GS} = 10 V, I_D = 40 A		35		nC
Gate-Source Charge[c]	Q_{gs}			6		
Gate-Drain Charge[c]	Q_{gd}			8		
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 20 V, R_L = 0.5 Ω I_D ≃ 40 A, V_{GEN} = 10 V, R_G = 2.5 Ω		14	30	ns
Rise Time[c]	t_r			7.5	15	
Turn-Off Delay Time[c]	$t_{d(off)}$			30	60	
Fall Time[c]	t_f			14	30	
Source-Drain Ciode Ratings and Characteristics (T_C = 25°C)[b]						
Continuous Current	I_s				40	A
Pulsed Current	I_{SM}				100	
Forward Voltage[a]	V_{SD}	I_F = 40 A, V_{GS} = 0 V		1.0	1.50	V
Reverse Recovery Time	t_{rr}	I_F = 40 A, di/dt = 100 A/µs		30	60	ns

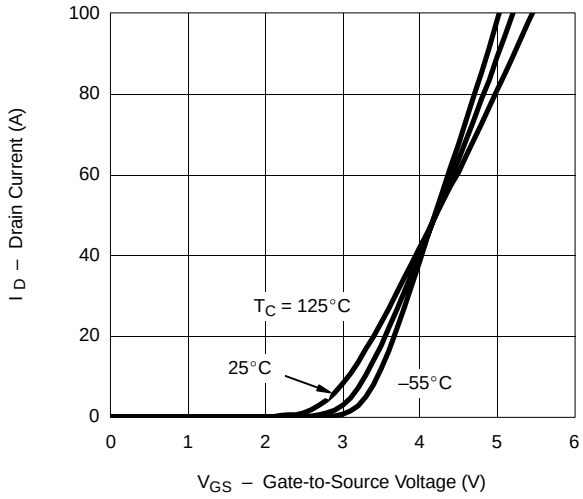
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

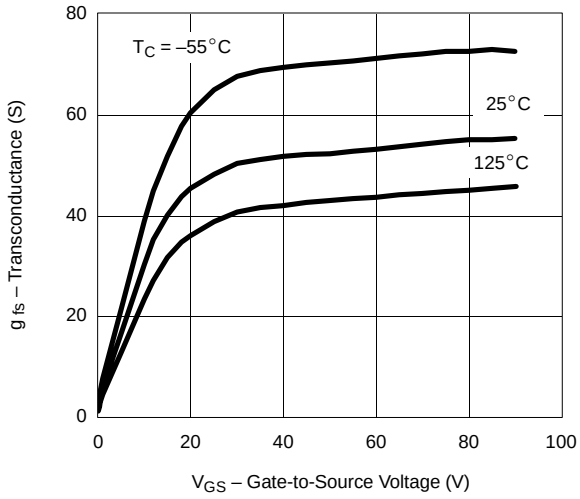
Output Characteristics



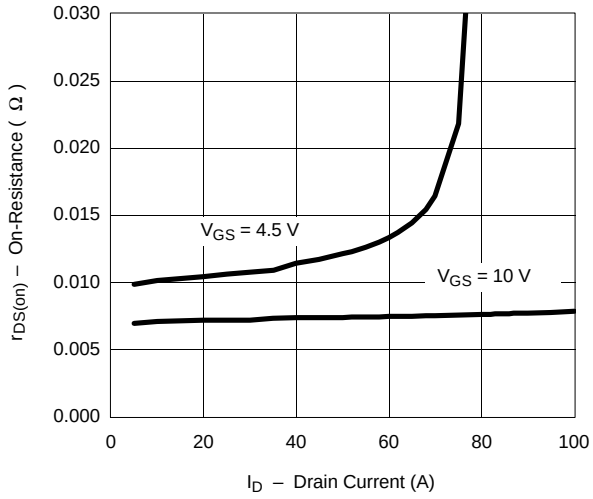
Transfer Characteristics



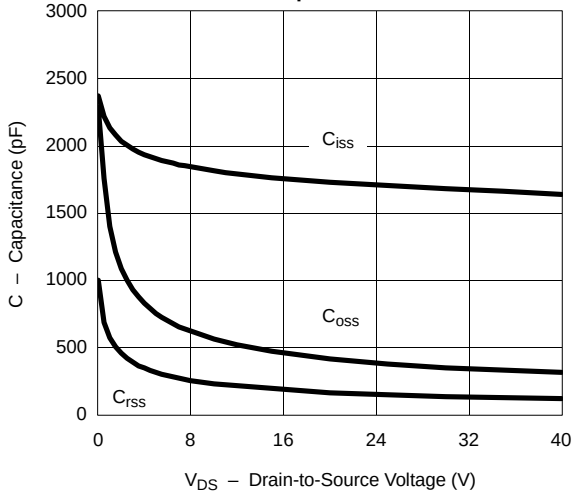
Transconductance



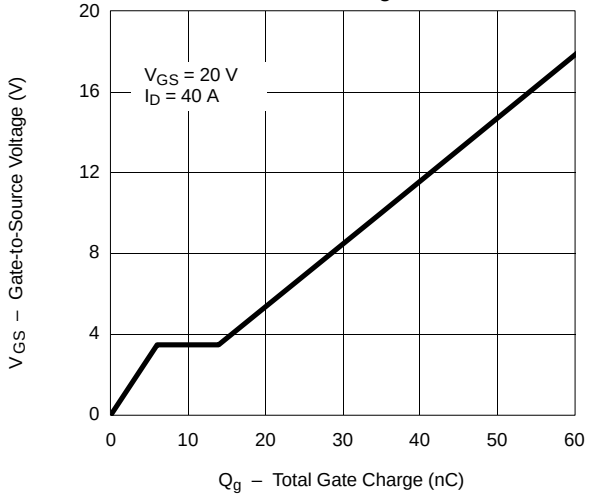
On-Resistance vs. Drain Current



Capacitance

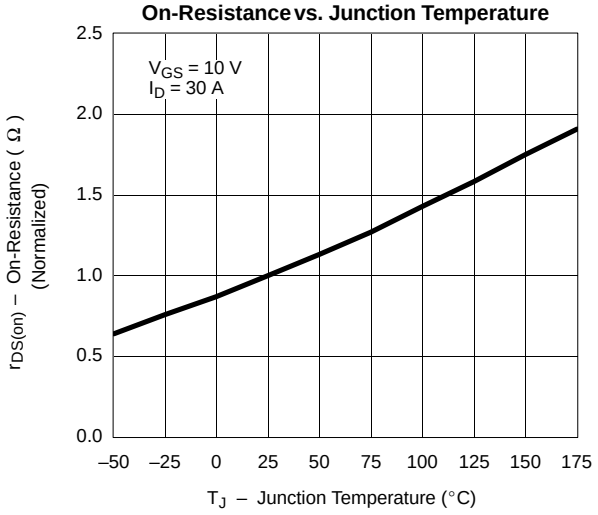


Gate Charge

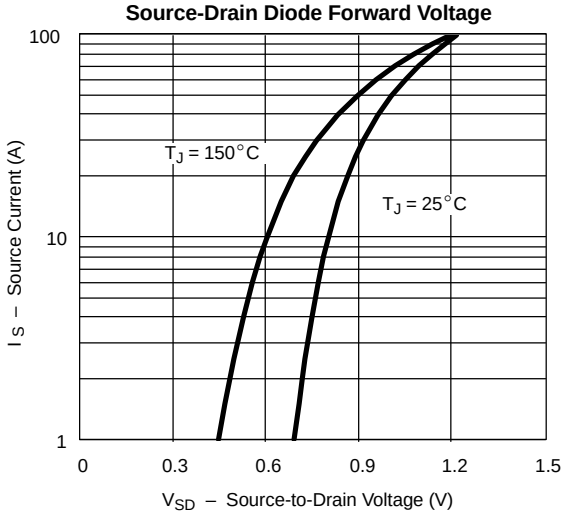


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

On-Resistance vs. Junction Temperature

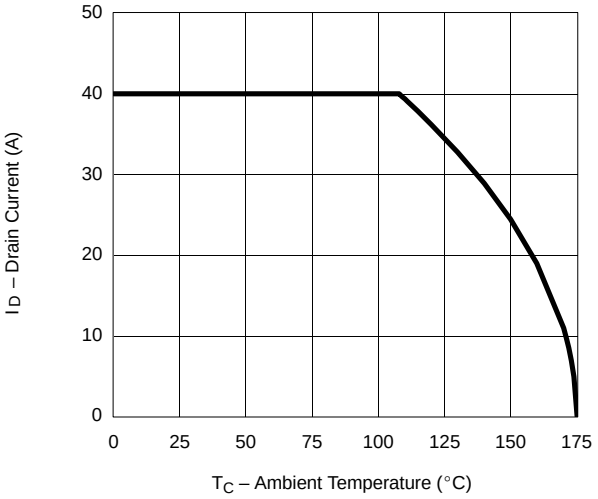


Source-Drain Diode Forward Voltage

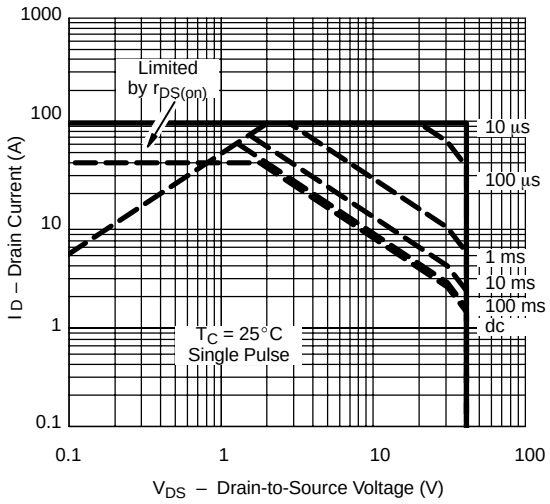


THERMAL RATINGS

Maximum Avalanche and Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case