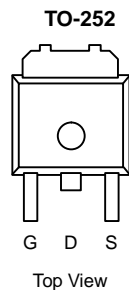




## N-Channel 40-V (D-S), 175°C MOSFET

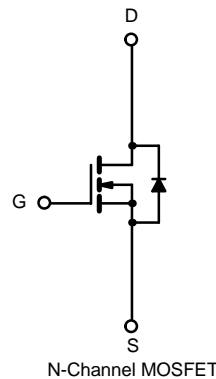
PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>a</sup>
40	0.010 @ $V_{GS} = 10$ V	40
	0.014 @ $V_{GS} = 4.5$ V	40

**175°C Rated**  
Maximum Junction Temperature



Drain Connected to Tab

Order Number:  
SUD40N04-10A



ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	$V_{DS}$	40	V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$		
Continuous Drain Current ( $T_J = 175^\circ\text{C}$ )	$I_D$	$T_C = 25^\circ\text{C}$	40 <sup>a</sup>	A
		$T_C = 100^\circ\text{C}$	40 <sup>a</sup>	
Pulsed Drain Current	$I_{DM}$	100		
Avalanche Current	$I_{AR}$	30		
Repetitive Avalanche Energy <sup>b</sup>	$E_{AR}$	45	mJ	
Power Dissipation	$P_D$	71 <sup>c</sup>	W	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to 175	$^\circ\text{C}$	

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Junction-to-Ambient <sup>d</sup>	$R_{thJA}$	$t \leq 10$ sec.	15	18	$^\circ\text{C/W}$
		Steady State	40	50	
Junction-to-Case	$R_{thJC}$	1.75	2.1		

Notes:

- a. Package limited.
- b. Duty cycle  $\leq 1\%$ .
- c. See SOA curve for voltage derating.
- d. Surface mounted on 1" FR4 board.

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

## Notes:

- Pulse test; pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.