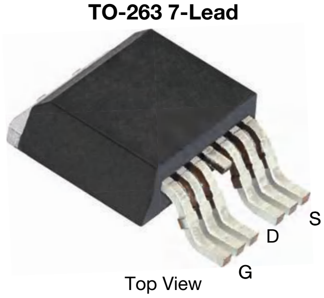
NP180N055TUJ-VB Datasheet
N-Channel 60 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	60
$R_{DS(on)}$ (Ω) at V_{GS} = 10 V	0.00163
I_D (A)	150
Configuration	Single
Package	TO-263-7L

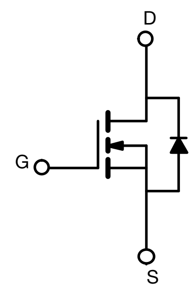
FEATURES
- Trench power MOSFET
- Package with low thermal resistance
- 100 % R_g and UIS tested

RoHS
COMPLIANT
HALOGEN
FREE

TO-263 7-Lead



Top View



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)				
PARAMETER		**SYMBOL**	**LIMIT**	**UNIT**
Drain-source voltage		V_{DS}	60	V
Gate-source voltage		V_{GS}	± 20	V
Continuous drain current	T_C = 25 °C	I_D	150	A
	T_C = 125 °C		120 [a]	
Continuous source current (diode conduction) [a]		I_S	120	A
Pulsed drain current [b]		I_{DM}	400	A
Single pulse avalanche current	L = 0.1 mH	I_{AS}	75	A
Single pulse avalanche energy	L = 0.1 mH	E_{AS}	281	mJ
Maximum power dissipation [b]	T_C = 25 °C	P_D	375	W
	T_C = 125 °C		125	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +175	°C

THERMAL RESISTANCE RATINGS				
PARAMETER		**SYMBOL**	**LIMIT**	**UNIT**
Junction-to-ambient	PCB mount [c]	R_{thJA}	40	°C/W
Junction-to-case (drain)		R_{thJC}	0.4	°C/W

Notes

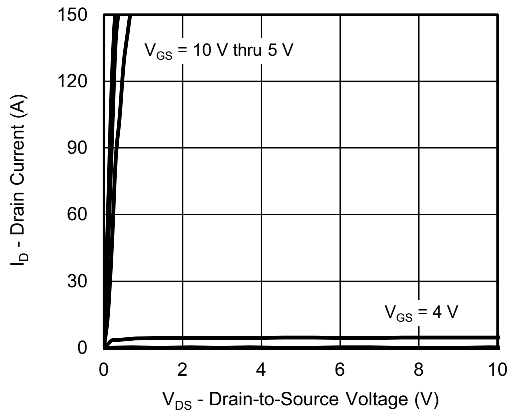
a. Package limited
b. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2 %
c. When mounted on 1" square PCB (FR4 material)

SPECIFICATIONS (T_C = 25 °C, unless otherwise noted)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static						
Drain-source breakdown voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 μA	60	-	-	V
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	2.5	3.0	3.5	V
Gate-source leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V	-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 60 V	-	-	1	μA
		V_{GS} = 0 V, V_{DS} = 60 V, T_J = 125 °C	-	-	50	μA
		V_{GS} = 0 V, V_{DS} = 60 V, T_J = 175 °C	-	-	250	μA
On-state drain current [a]	$I_{D(on)}$	V_{GS} = 10 V, $V_{DS} \geq$ 5 V	120	-	-	A
Drain-source on-state resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 30 A	-	0.00163	-	Ω
		V_{GS} = 10 V, I_D = 30 A, T_J = 125 °C	-	0.00300	-	Ω
		V_{GS} = 10 V, I_D = 30 A, T_J = 175 °C	-	0.00360	-	Ω
Forward transconductance [b]	g_{fs}	V_{DS} = 15 V, I_D = 30 A	-	142	-	S
Dynamic [b]						
Input capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	-	9100	11 900	pF
Output capacitance	C_{oss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	-	3550	4700	pF
Reverse transfer capacitance	C_{rss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	-	160	220	pF
Total gate charge [c]	Q_g	V_{GS} = 10 V, V_{DS} = 30 V, I_D = 50 A	-	123	185	nC
Gate-source charge [c]	Q_{gs}	V_{GS} = 10 V, V_{DS} = 30 V, I_D = 50 A	-	40	-	nC
Gate-drain charge [c]	Q_{gd}	V_{GS} = 10 V, V_{DS} = 30 V, I_D = 50 A	-	19	-	nC
Gate resistance	R_g	f = 1 MHz	4	8.6	13	Ω
Turn-on delay time [c]	$t_{d(on)}$	V_{DD} = 30 V, R_L = 0.6 Ω, $I_D \cong$ 50 A, V_{GEN} = 10 V, R_g = 1 Ω	-	48	75	ns
Rise time [c]	t_r	V_{DD} = 30 V, R_L = 0.6 Ω, $I_D \cong$ 50 A, V_{GEN} = 10 V, R_g = 1 Ω	-	26	40	ns
Turn-off delay time [c]	$t_{d(off)}$	V_{DD} = 30 V, R_L = 0.6 Ω, $I_D \cong$ 50 A, V_{GEN} = 10 V, R_g = 1 Ω	-	105	160	ns
Fall time [c]	t_f	V_{DD} = 30 V, R_L = 0.6 Ω, $I_D \cong$ 50 A, V_{GEN} = 10 V, R_g = 1 Ω	-	25	40	ns
Source-Drain Diode Ratings and Characteristics [b]						
Pulsed current [a]	I_{SM}		-	-	240	A
Forward voltage	V_{SD}	I_F = 50 A, V_{GS} = 0 V	-	0.84	1.5	V
Body diode reverse recovery time	t_{rr}	I_F = 25 A, di/dt = 100 A/μs	-	100	200	ns
Body diode reverse recovery charge	Q_{rr}	I_F = 25 A, di/dt = 100 A/μs	-	243	500	nC
Reverse recovery fall time	t_a	I_F = 25 A, di/dt = 100 A/μs	-	48	-	ns
Reverse recovery rise time	t_b	I_F = 25 A, di/dt = 100 A/μs	-	53	-	ns
Body diode peak reverse recovery current	$I_{RM(REC)}$		-	-4.6	-	A

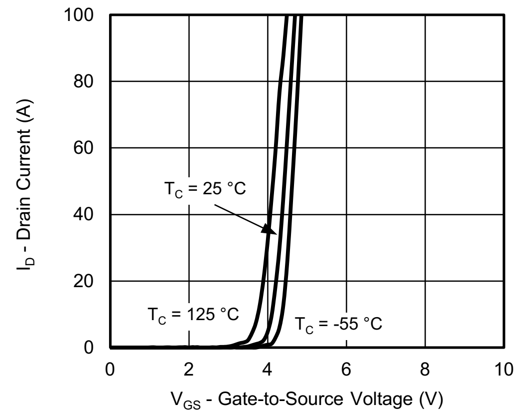
Notes

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

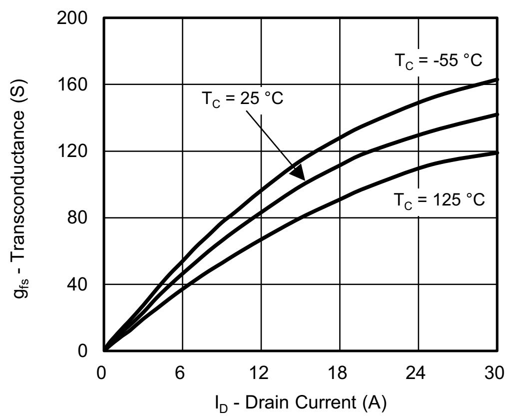
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



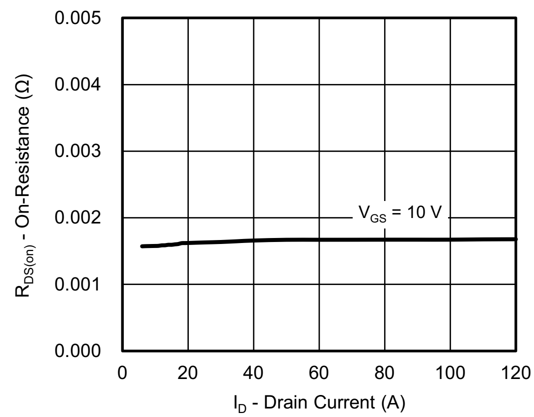
Output Characteristics



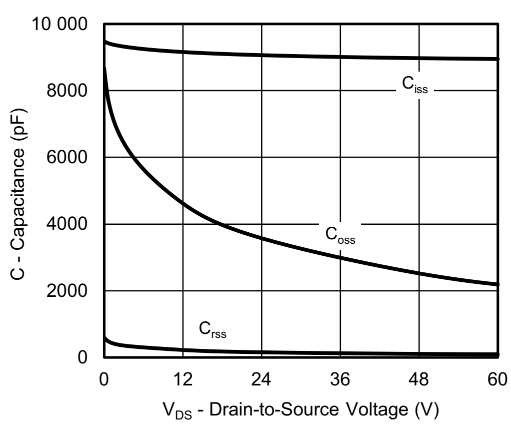
Transfer Characteristics



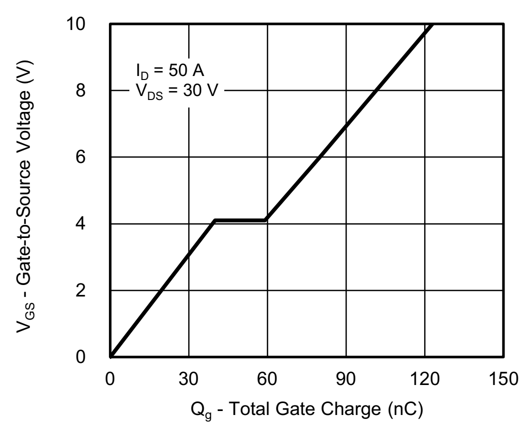
Transconductance



On-Resistance vs. Drain Current

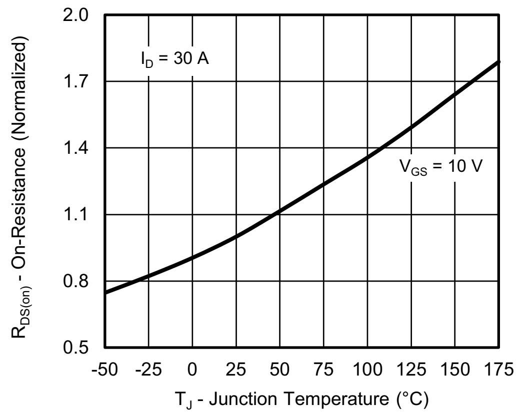


Capacitance

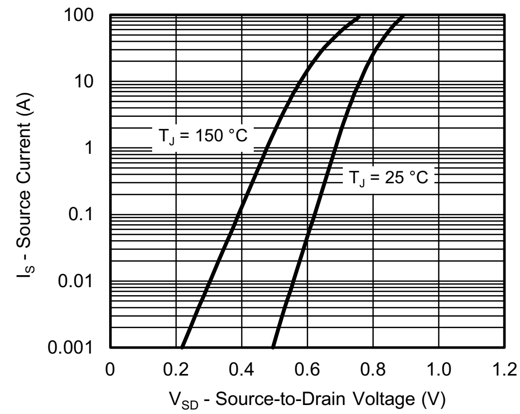


Gate Charge

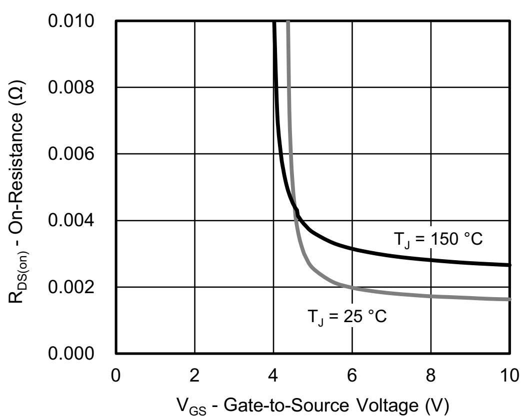
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



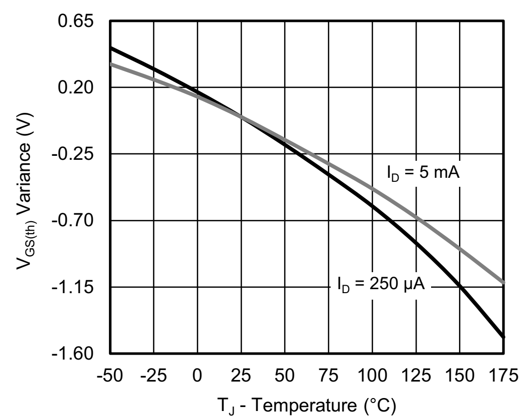
On-Resistance vs. Junction Temperature



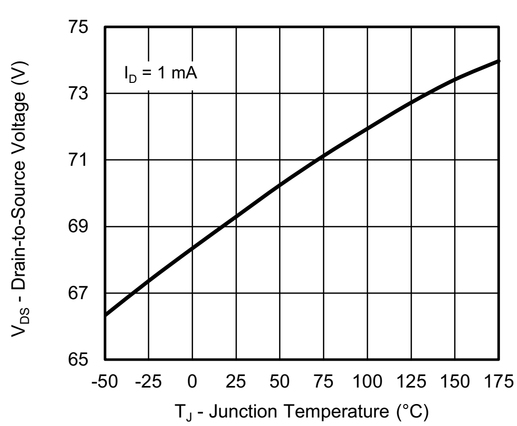
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

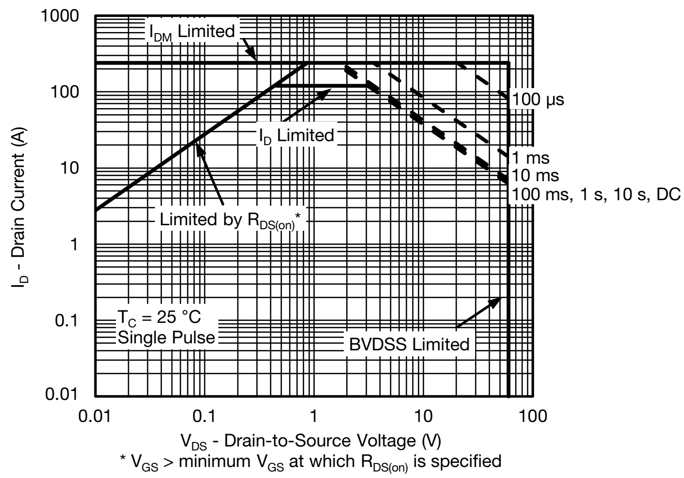


Threshold Voltage

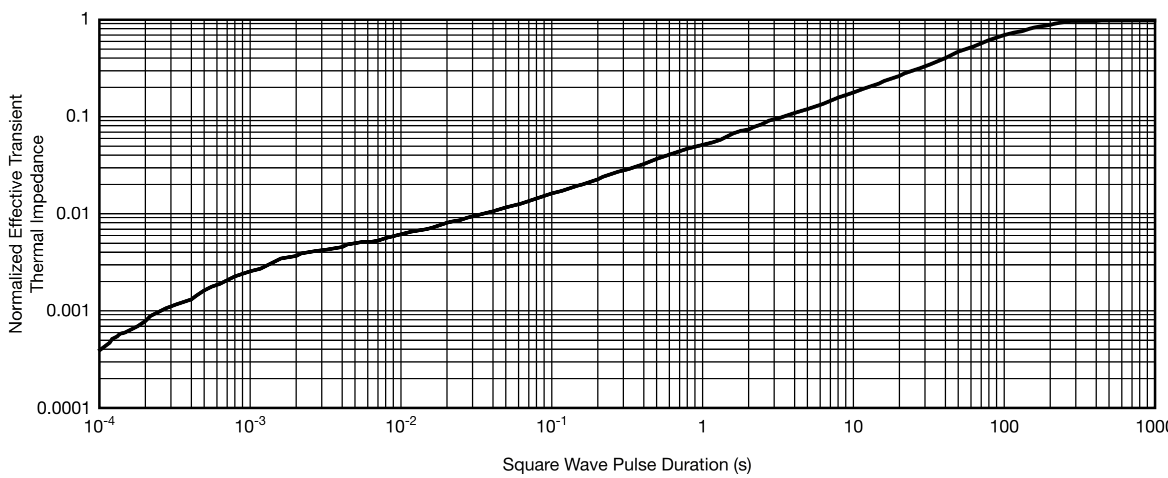


Drain Source Breakdown vs. Junction Temperature

THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)

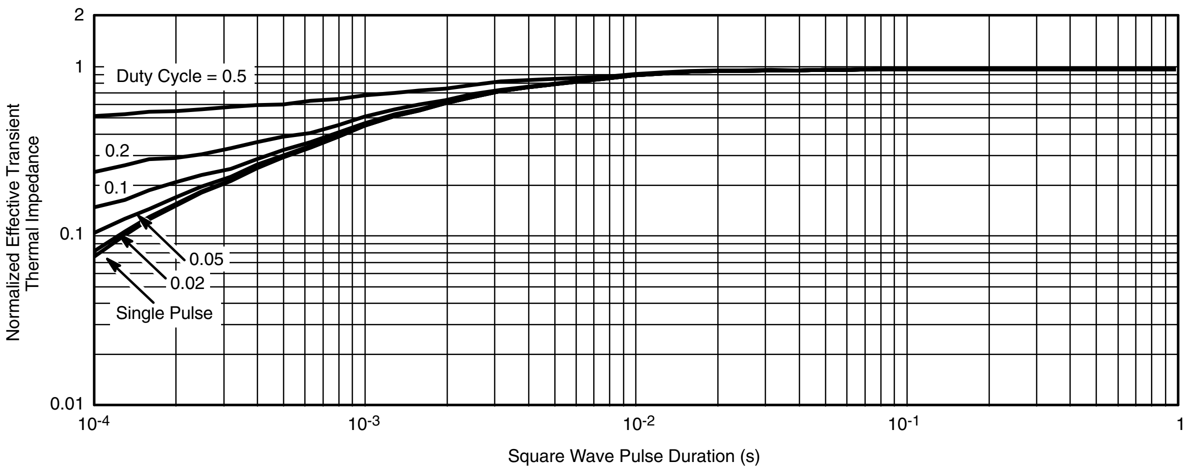


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Case

Note

- The characteristics shown in the two graphs
  - Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)
  - Normalized Transient Thermal Impedance Junction-to-Case (25 °C)

  are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions

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