



# MU3012D

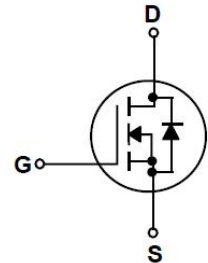
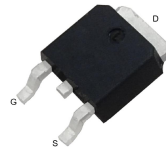
## N-Channel Enhancement Mode MOSFET

### Features

- ◆ 30V, 100A,  $R_{DS(ON)}$ (Typ.) = 2.9mΩ@ $V_{GS} = 10V$
- ◆ Lead Free
- ◆ Advanced Trench Technology
- ◆ Excellent  $R_{DS(ON)}$  and Low Gate Charge

### Application

- ◆ Load Switch
- ◆ PWM Application
- ◆ Power Management



### Absolute Maximum Ratings $T_c = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rating	Unit
$V_{DS}$	Drain-Source Voltage <sup>a</sup>	30	V
$V_{GS}$	Gate-Source Voltage	± 20	
$I_D$	Drain Current-Continuous	$T_c = 25^\circ\text{C}$	100
		$T_c = 100^\circ\text{C}$	63
$I_{DM}$	Drain Current-Pulsed <sup>b</sup>	400	A
$P_D$	Maximum Power Dissipation @ $T_J = 25^\circ\text{C}$	78	W
$E_{AS}$	Single Pulsed Avalanche Energy <sup>d</sup>	175	mJ
$T_J, T_{STG}$	Operating and Store Temperature Range	150, -55 to 150	$^\circ\text{C}$

### Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.6	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	32	

### Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

#### ■ Off Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu\text{A}$	30	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 30V, V_{GS} = 0V$	-	-	1	$\mu\text{A}$
$I_{GSS}$	Forward Gate Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 20V$	-	-	±100	nA



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### ■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.3	1.9	2.5	V
$R_{DS(on)}$	Static Drain-Source On-Resistance <sup>c</sup>	$V_{GS} = 10V, I_D = 30A$	-	2.9	3.6	mΩ
		$V_{GS} = 4.5V, I_D = 20A$	-	4.7	6.1	

### ■ Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$C_{iss}$	Input Capacitance	$V_{DS} = 15V,$ $V_{GS} = 0V,$ $f = 1MHz$	-	3089	-	pF
$C_{oss}$	Output Capacitance		-	372	-	
$C_{rss}$	Reverse Transfer Capacitance		-	302	-	

### ■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 15V,$ $V_{GS} = 10V,$ $I_D = 30A,$ $R_{GEN} = 3\Omega$	-	11	-	ns
$t_r$	Turn-On Rise Time		-	29	-	
$t_{d(off)}$	Turn-Off Delay Time		-	47	-	
$t_f$	Turn-Off Fall Time		-	18	-	
$Q_g$	Total Gate Charge	$V_{DS} = 15V,$ $V_{GS} = 0 \text{ to } 10V,$ $I_D = 30A$	-	58	-	nC
$Q_{gs}$	Gate-Source Charge		-	12	-	
$Q_{gd}$	Gate-Drain Charge		-	13	-	

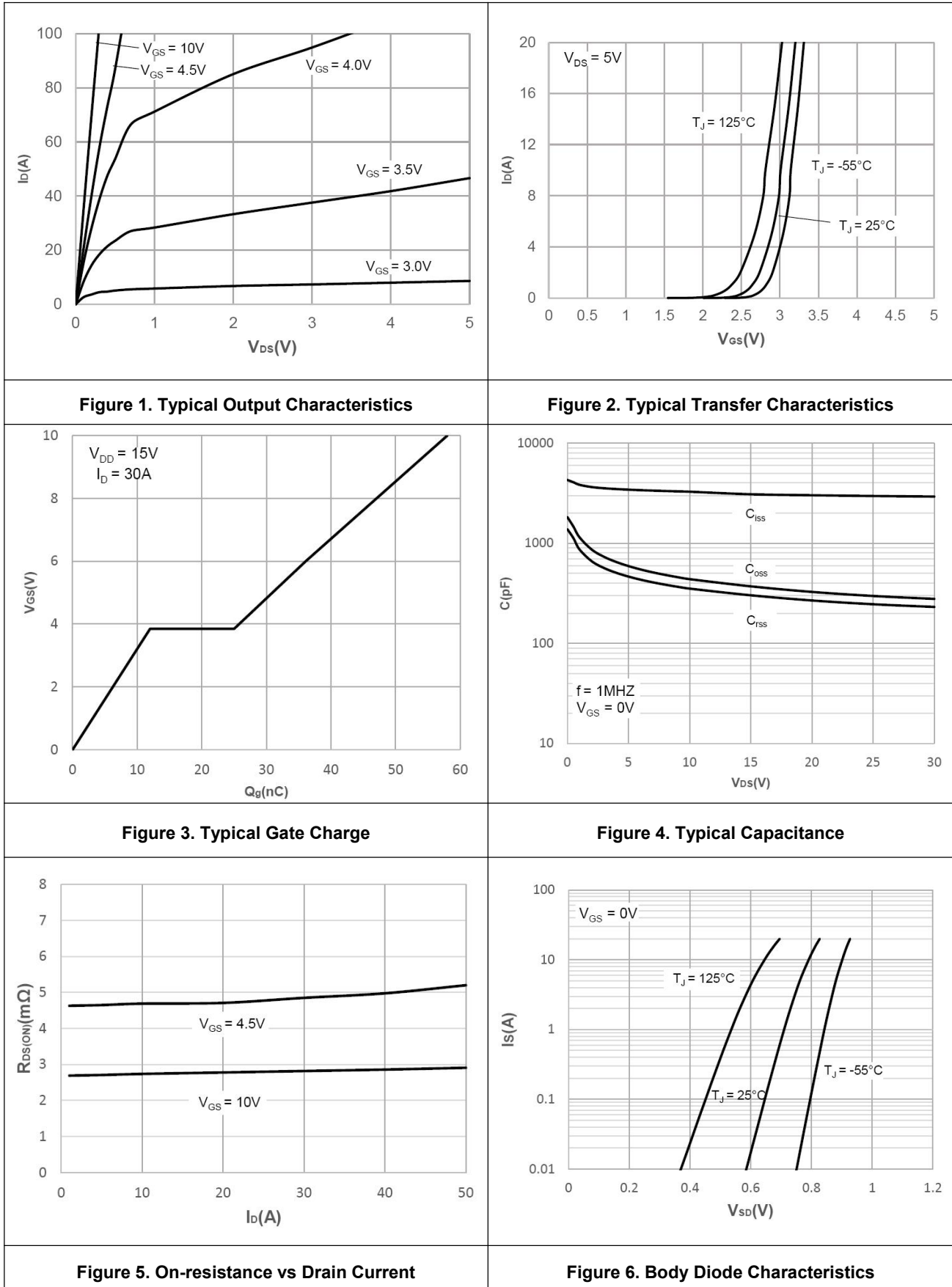
### ■ Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$I_S$	Drain-Source Diode Forward Continuous Current	$V_{GS} = 0V$	-	-	100	A
$I_{SM}$	Maximum Pulsed Current	$V_{GS} = 0V$	-	-	400	A
$V_{SD}$	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_S = 30A$	-	-	1.2	V
$T_{rr}$	Body Diode Reverse Recovery Time	$I_F = 30A,$ $di/dt = 100A/\mu s$	-	16	-	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$I_F = 30A,$ $di/dt = 100A/\mu s$	-	7	-	nC

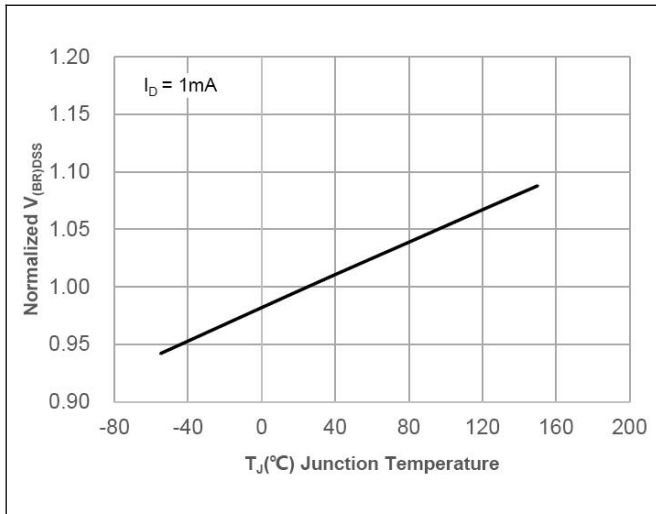
Notes:

- $T_J = +25\text{ }^\circ\text{C}$  to  $+150\text{ }^\circ\text{C}$
- Repetitive rating; pulse width limited by maximum junction temperature.
- Pulse width  $\leq 300\mu s$ ; duty cycle  $\leq 2\%$
- $L = 0.5mH, V_{DD} = 30V, I_{AS} = 26.5A, R_G = 25\Omega$  Starting  $T_J = 25\text{ }^\circ\text{C}$ .

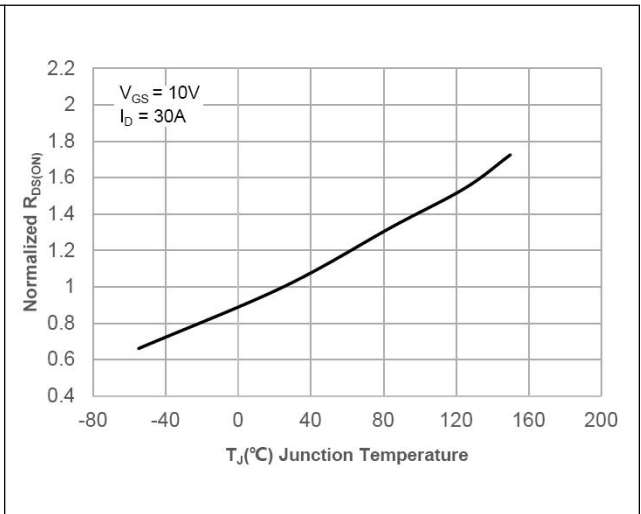
### ■ Characteristic Curve



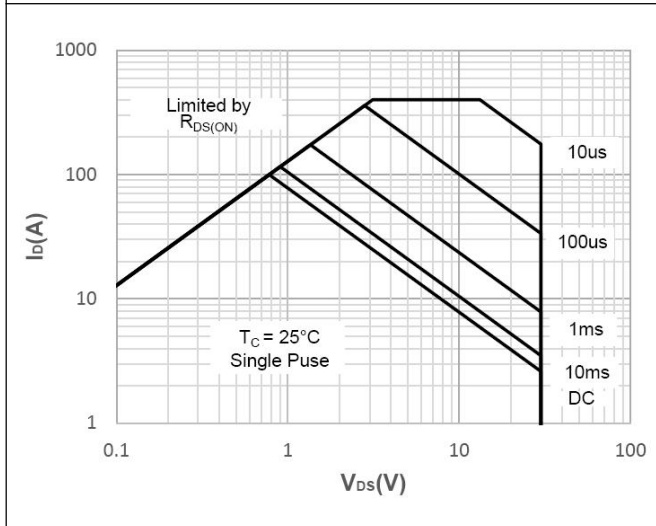
### ■ Characteristic Curve



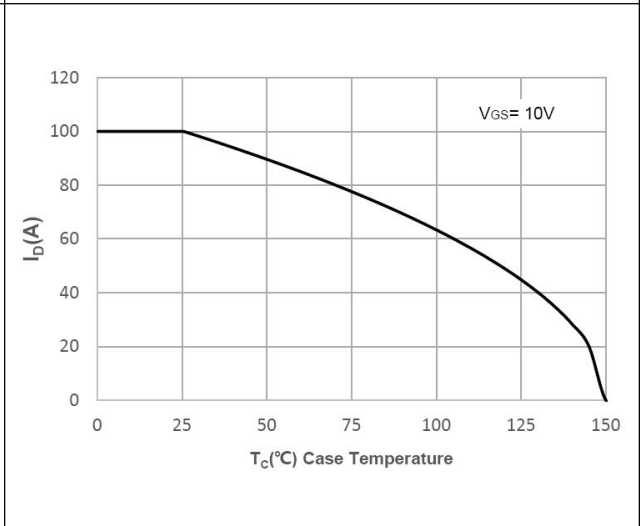
**Figure 7. Normalized Breakdown voltage vs Junction Temperature**



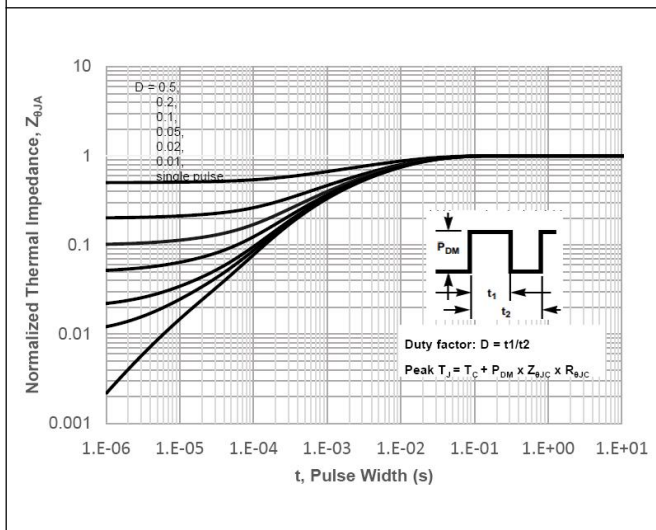
**Figure 8. Normalized on Resistance vs Junction Temperature**



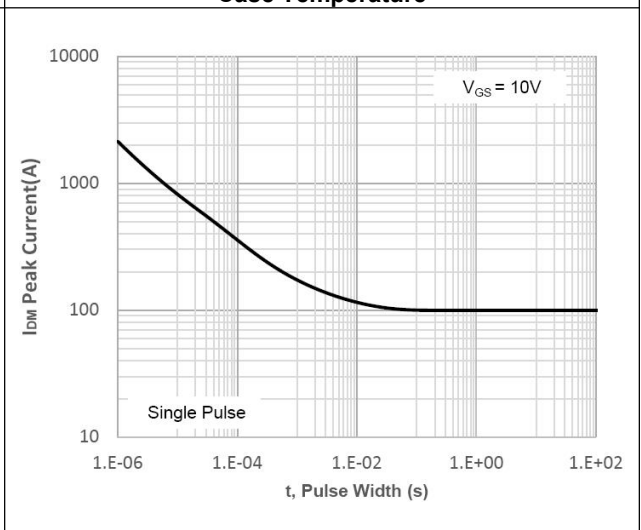
**Figure 9. Maximum Safe Operating Area**



**Figure 10. Maximum Continuous Drain Current vs Case Temperature**



**Figure 11. Normalized Maximum Transient Thermal Impedance**



**Figure 12. Peak Current Capacity**

### Package Information

# TO-252

