



## Electrical Characteristics

$T_A = 25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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### Off Characteristics

$BV_{DSS}$	Drain–Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$		39		mV/°C
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 24\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
$I_{GSS}$	Gate–Body Leakage	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$			$\pm 100$	nA

### On Characteristics (Note 2)

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$	1	1.4	3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250\ \mu\text{A}$ , Referenced to $25^\circ\text{C}$		-5		mV/°C
$R_{DS(on)}$	Static Drain–Source On–Resistance	$V_{GS} = 10\text{ V}, I_D = 21\text{ A}$ $V_{GS} = 4.5\text{ V}, I_D = 18\text{ A}$ $V_{GS} = 10\text{ V}, I_D = 21\text{ A}, T_J = 125^\circ\text{C}$		3.3 4.2 4.4	3.7 5.0 5.5	m $\Omega$
$g_{FS}$	Forward Transconductance	$V_{DS} = 10\text{ V}, I_D = 21\text{ A}$		118		S

### Dynamic Characteristics

$C_{iss}$	Input Capacitance	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$		4040		pF
$C_{oss}$	Output Capacitance			1730		pF
$C_{riss}$	Reverse Transfer Capacitance			160		pF
$R_G$	Gate Resistance	$f = 1.0\text{ MHz}$	0.2	0.9	1.5	$\Omega$

### Switching Characteristics (Note 2)

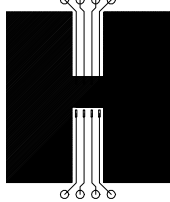
$t_{d(on)}$	Turn–On Delay Time	$V_{DD} = 15\text{ V}, I_D = 1\text{ A},$ $V_{GS} = 10\text{ V}, R_{GEN} = 6\ \Omega$		12	21	ns
$t_r$	Turn–On Rise Time			11	20	ns
$t_{d(off)}$	Turn–Off Delay Time			56	90	ns
$t_f$	Turn–Off Fall Time			68	108	ns
$Q_{g(TOT)}$	Total Gate Charge at $V_{GS} = 10\text{ V}$	$V_{DD} = 15\text{ V}, I_D = 21\text{ A}$		58.5	82	nC
$Q_{g(TOT)}$	Total Gate Charge at $V_{GS} = 5\text{ V}$			30	42	nC
$Q_{gs}$	Gate–Source Charge			9.5		nC
$Q_{gd}$	Gate–Drain Charge			5.5		nC

### Drain–Source Diode Characteristics and Maximum Ratings

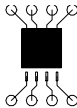
$V_{SD}$	Drain–Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 2.1\text{ A}$ (Note 2)		0.7	1.2	V
$t_{rr}$	Diode Reverse Recovery Time	$I_F = 21\text{ A},$ $di_F/dt = 100\text{ A}/\mu\text{s}$		51		ns
$I_{RM}$	Diode Reverse Recovery Current			1.5		A
$Q_{rr}$	Diode Reverse Recovery Charge			37		nC

#### Notes:

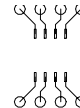
1.  $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.



a) 50°/W when mounted on a 1 in<sup>2</sup> pad of 2 oz copper



b) 105°/W when mounted on a .04 in<sup>2</sup> pad of 2 oz copper



c) 125°/W when mounted on a minimum pad.

Scale 1 : 1 on letter size paper

2. Pulse Test: Pulse Width < 300 $\mu\text{s}$ , Duty Cycle < 2.0%

## Typical Characteristics

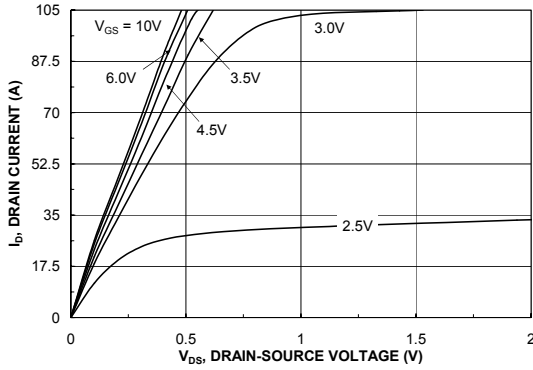


Figure 1. On-Region Characteristics.

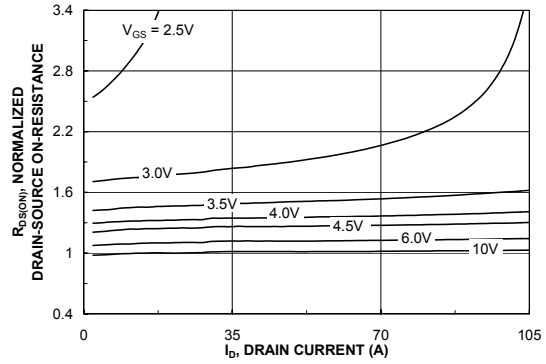


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

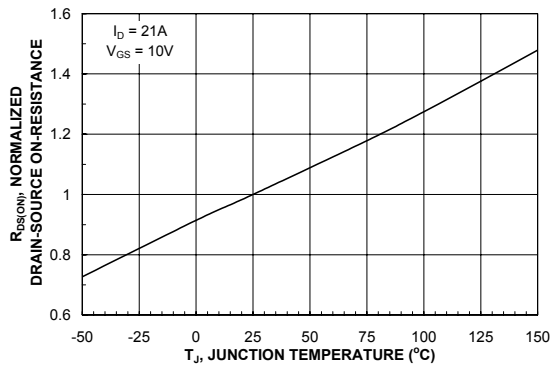


Figure 3. On-Resistance Variation with Temperature.

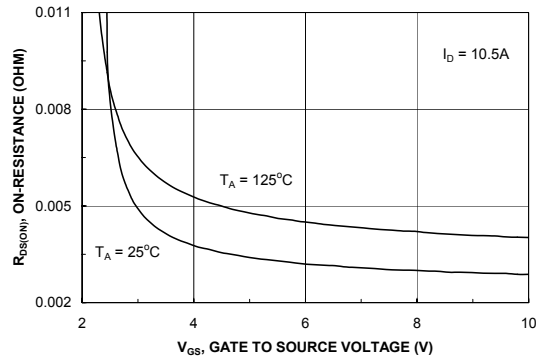


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

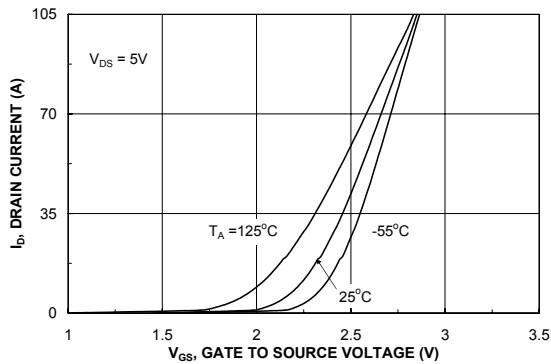


Figure 5. Transfer Characteristics.

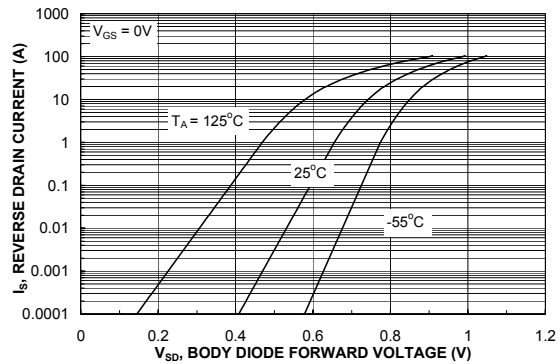
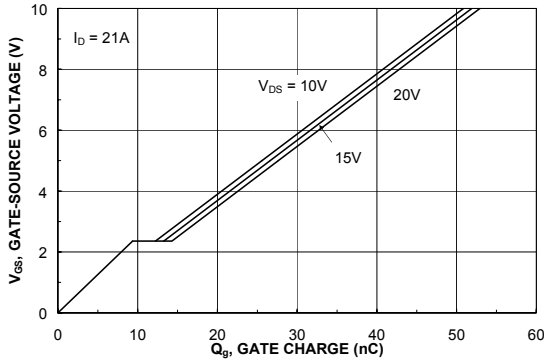
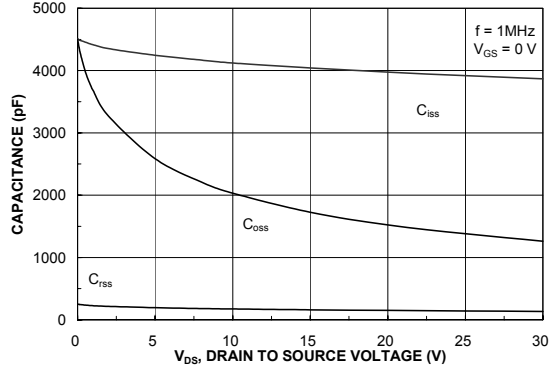


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

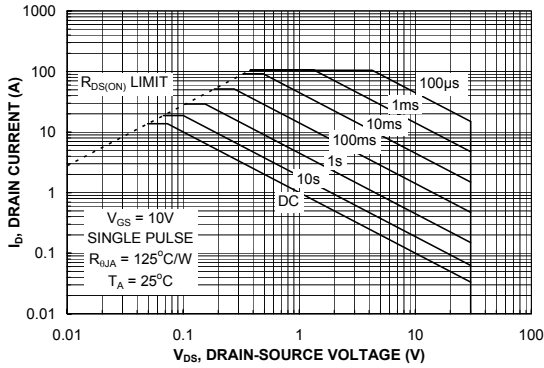
**Typical Characteristics** (continued)



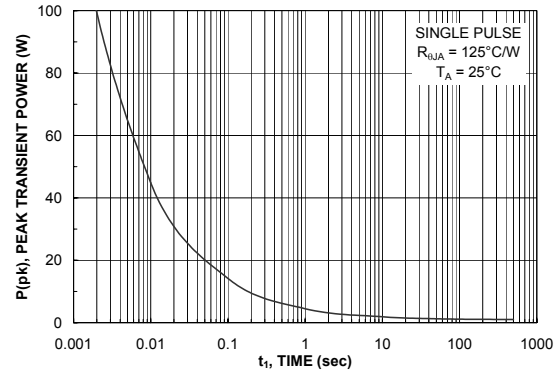
**Figure 7. Gate Charge Characteristics.**



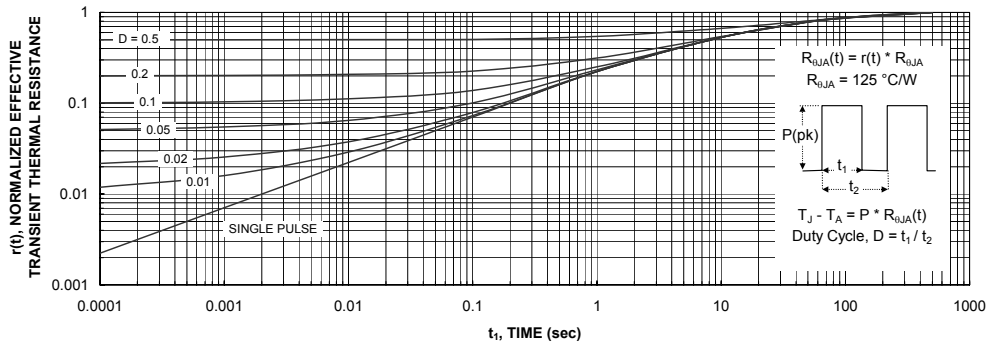
**Figure 8. Capacitance Characteristics.**



**Figure 9. Maximum Safe Operating Area.**



**Figure 10. Single Pulse Maximum Power Dissipation.**



**Figure 11. Transient Thermal Response Curve.**

Thermal characterization performed using the conditions described in Note 1c.  
Transient thermal response will change depending on the circuit board design.

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